5 JAN 1962

NEW ZEALAND
JOURNAL OF

AGRICULTURE

NOVEMBER
1961

GORSE

TODAY

GONE

TOMORROW!

Here's proof of the astonishing killing power of Weedone! The top photograph, taken on the day of spraying, gives you a good idea of the size of the problem. The second taken a few months later shows the same patch completely killed. (The brittle residue can easily be cleaned mechanically.) You, too, can clear acres of Gorse for productive land, see your Weedone Service Distributor now!

If you have a GORSE problem consult the Weedone Service for

WEEDONE SPECIAL 2,4,5-T

IVON WATKINS LTD., P.O. BOX 144, NEW PLYMOUTH

NEW ZEALAND
Journal of Agriculture

Vol. 103 No. 5 15 November 1961
Editor: G. J. Neale P.O. Box 2298, Wellington

50 Years' Research at Marton …… 410
Care of Livestock during December …… 418
Seasonal Notes …… 419
Beef and Veal from Dairy Farms …… J. C. Gerring …… 421
Kumara Seed Lines Can be Improved …… G. J. Wilson …… 424
Fallowing and Chemical Crop Establishment …… L. W. Blackmore …… 425
Grassland Association Award to Mr P. W. Smallfield …… 433
Vaccination against Contagious Abortion …… 434
Liming in New Zealand …… C. During …… 436
Domestic Beekeeping …… G. L. Jeffery …… 447
Wool Sales and Ram Fairs …… 448
Meteorological Records for September …… 448
Dairy Produce Graded for Export …… 448
Lungworm Disease in Calves …… G. A. Durham …… 449

Vegetable Production:

Carrots and Parsnips …… 451
December Work in the Home Garden …… A. G. Kennelly …… 461
The Pros and Cons of High Stocking Rate …… C. P. McMeekan …… 465
Radio Broadcasts …… 469
Fire Prevention on Farms …… L. H. Weston …… 470
Selenium Treatment of Animal Diseases and Unthriftiness W. J. Hartley …… 475
A. and P. Show Dates …… 483
New Sprays for the Home Orchard …… S. Frew …… 485 No
Round the Research Stations …… 493
Town Supply Herds Certified Clear of Reactors to Tuberculin Test …… 495

The Flower Garden:

Gardens with Streams …… K. H. Marcussen …… 497
Garden Work in December …… Joy Watkins …… 505
Instead of Pastry …… Naomi F. Banks …… 508
Cooking with New Zealand Wines …… Janet W. Roberts …… 509

Cover

Most commercial beekeepers in New Zealand distribute their hives in groups in out-apiaries such as that shown in the Raukawa district, near Hastings. The principal nectar source is the clover in farm pastures and the bees provide a valuable service in the pollination of economic crops. The parklike setting of the photograph was originally created as the site for a farm home that was not proceeded with after the Hawke's Bay earthquake.

SUBSCRIPTIONS

Within N.Z.: 10s. a year.

Overseas: 13s. (sterling) a year.

Payable at any office of the Departmen of Agriculture.

The "Journal" may be ordered from any bookseller or newsagent.

Individual copies, 1s. each, post free.

COPYRIGHT PROVISIONS

Articles in the "Journal" are copyright, but may be reprinted if both the "Journal" and author are acknowledged and the articles are not associated with advertising material.

The Minister of Agriculture does not accept responsibility for any of the private and trade advertisements included in this publication.

Registered at the G.P.O., Wellington, as a magazine.

Published by Direction of Hon. T. L. Hayman, Minister of Agriculture

50 Years of Research at the Marton Experimental Area

THE Marton Experimental Area has the distinction of being one of the oldest agricultural research stations still in existence in New Zealand. The Ruakura Farm of Instruction (now the Ruakura Animal Research Station) was opened on 23 April 1912, but the first experimental plots were laid down at Marton in the spring of 1910. Lincoln College has been conducting research since its establishment in 1880 and can claim seniority, but the Marton Experimental Area, from the beginning, has been concerned primarily with agricultural experiments.

IN the spring of 1910 the Department of Agriculture laid down a series of experimental plots on the property of Sir James G. Wilson at Marton with the object of testing varieties of crops, many of them introduced from overseas countries. The type of crop was quite varied, ranging from the major cereals wheat, oats, and barley, over crops like sorghum, maize, linseed, and brassicas of various kinds, down to soya beans, velvet beans, tick beans, and cow peas. These plots were repeated annually for some years and became referred to as the Marton Experimental Area.

In 1913 it was stated: "In addition to testing suitability and nature of the varieties the plots at Marton have mainly been utilised in order to supply the initial stocks to outside experimenters until these are established on the market".

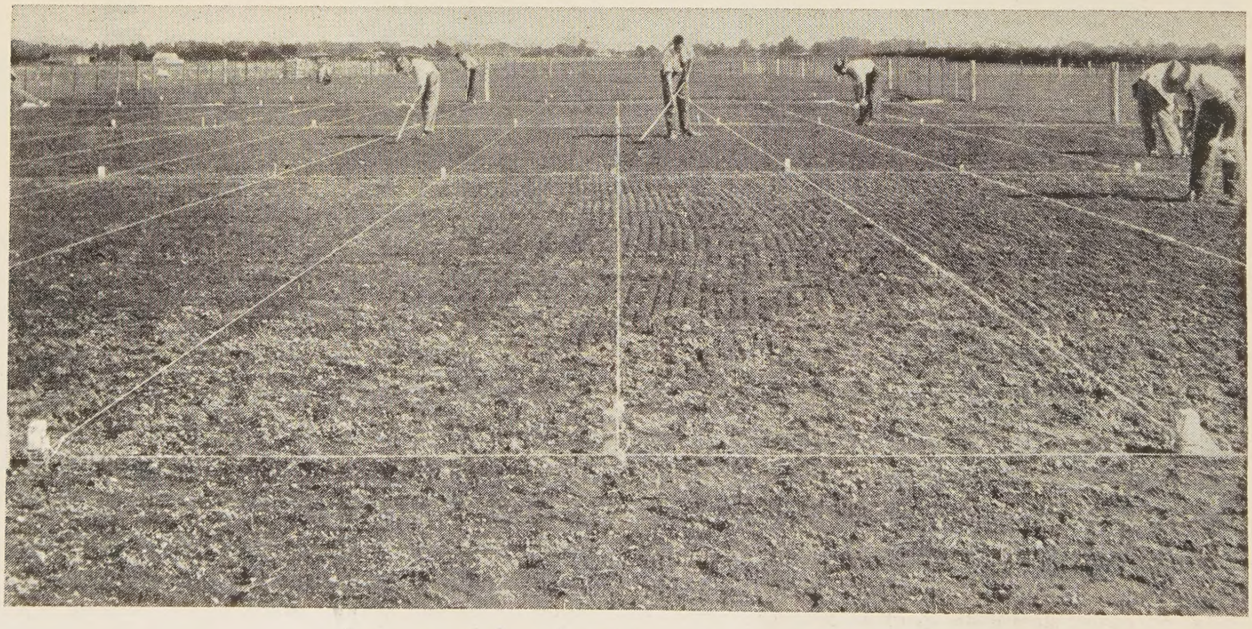
The extent of the trials increased with the years and in 1919, when some 50 acres were being used, the Department, through the generosity of Sir James Wilson, obtained the use of the area on a semi-permanent basis. The terms of the arrangement were the free use of the land for experimentation. This arrangement continued for many years until the late 1950s, when the Department eventually took over a leased tenure.

In the earlier years of the Marton Experimental Area, annual cropping was a major feature of farming in the district, and many investigations into cropping experiments were made. Apart from the work with crop varieties a number of feeding and palatability trials were conducted. In 1919-20 there were feeding trials with lambs on rape versus peas, and the lamb weight gains were recorded. The suitability of a range of brassica crops for grazing with sheep was investigated; and it is of interest to read of Sudan grass being compared with Japanese and Hungarian millet for summer greenfeed.

The plots had to be spelled from cropping after some years and the spelled plots were sown into pasture trials comparing strains and species of pasture plants and the effects of topdressing. The measurements of production from such trials were made by weighing the hay from the plots.

The Marton Experimental Area was begun wholly for the testing of arable crops. However, by the mid twenties the increasing importance of grassland farming was becoming recognised, and in 1926-27 it was stated: "The growing of cash crops is being gradually reduced at Marton Area, each year more of the land being devoted to experimental work with grasses, clovers, and pasture topdressing". In that year, of the total area of 63 acres, 20 acres were in annual crop.

In 1931 the "New Zealand Journal of Agriculture" said: "The work of the Marton Experimental Area may be claimed to have increased in value each succeeding year as the production of grassland has become more and



Sowing one of the early pasture species strains trials at Marton.

more recognised to be the chief factor underlying primary production in New Zealand".

SOIL FERTILITY INVESTIGATIONS

Early Period

In 1928 A. W. Hudson and B. W. Doak began to investigate by a series of experiments the main questions on soil fertility requirements for pasture production which needed an answer at that time. To this day the results from these trials are used as a basis for advice on liming and phosphate topdressing of millions of acres of land in New Zealand.

Liming

Hudson and Doak examined carefully the most efficient method of liming pasture. Their results showed that at Marton an initial dressing of 1 ton of limestone per acre followed by the same rate of application at four-year intervals would maintain pasture production and the lime and pH status of the soil at a satisfactory level. This in fact meant 5 cwt of lime per acre as a mean annual maintenance dressing, a considerable amount. They found, however, that savings were possible if lime was applied each year. Applied each year, 3 cwt per acre was enough to make up the losses of calcium from the topsoil.

No other investigations in New Zealand have determined lime requirements over a period of many years with equal accuracy, though, clearly, there is a need for the work to be repeated under present conditions.

Phosphate

Hudson concentrated on two subjects —forms of phosphatic fertilisers and time and frequency of their applications. He established that superphosphate was the most efficient fertiliser on limed ground, that it did not increase soil acidity, and that it acted much more quickly than basic slag or ground North African rock phosphate.

Chemical analyses of soil and plant from the superphosphate, North African rock phosphate, and basic slag treatments showed clearly the marked liming value of basic slag. Basic slag was shown to be about equivalent weight for weight to limestone in reducing the acidity of the Marton soil.

North African rock phosphate, on the other hand, reduced soil acidity only slightly. This experiment at Marton gives the best measure of the liming value of basic slag which we have in New Zealand.

The investigation on time of application of superphosphate showed that at Marton pasture responses to superphosphate fell off rather steeply six months after application. Thus, for the maximum value of topdressing to be obtained for the winter season, superphosphate should be applied in autumn. As phosphatic topdressing usually produces the best relative pasture responses in late autumn-winter, it is not surprising that early autumn topdressing has become so popular. The experimental basis for this custom was to a great degree established at Marton.

An experiment to examine frequencies of topdressing of superphosphate showed that annual applications were much superior to applications every second year and slightly inferior to three dressings a year. The same total amount of superphosphate was used in these trials. From considerations of cost and convenience it was clear that on the Marton soil not more than annual topdressing was needed.

Later Period

The most important questions at the time on pasture topdressing on the Marton soil had been answered by Hudson. This and other experimental work in which regular basal dressings of lime and phosphatic fertilisers were used led to a gradual disappearance of areas on which really good responses to lime and phosphatic fertilisers could be obtained. The remaining small areas of phosphate-deficient land were used to compare forms of phosphatic fertiliser, including serpentine superphosphate, Nauru rock-superphosphate mixtures, and many others.

Professor Hudson's Views:

Marton's Work in Forefront of World Grassland Studies

PROFESSOR A. W. Hudson, who as a Department of Agriculture officer was associated for six years with the Marton Area, and later as Professor of Soils and Field Husbandry at Massey Agricultural College continued his first-hand acquaintance with work there, writes:

Though, originally, Marton was intended as a place at which simple experiments and demonstrations likely to be of value to the farming of the district could be carried out, it developed into a dominantly grassland research area from about 1930 onward. The work undertaken, while still of local importance and interest, had a much wider application, however. The change in the type of work arose out of a suggestion in 1928 by Mr A. H. Cockayne (then Director of the Plant Research Station at Palmerston North and later Director-General of Agriculture) that the production from grassland should be studied and measured throughout all seasons of the year. Before this most measurements were made on the herbage produced for hay during the high production period.

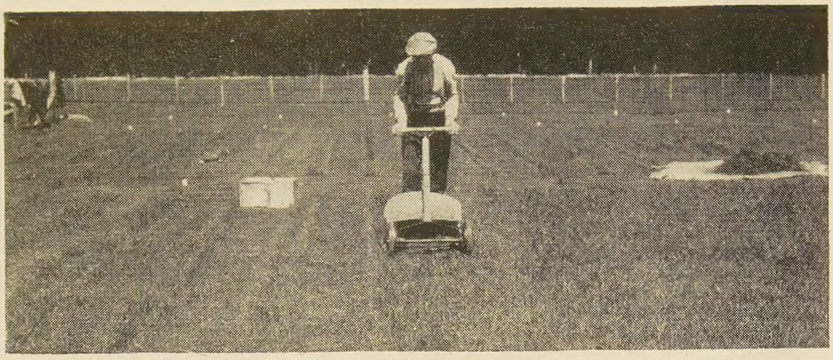
Cockayne pointed out that yields during the low production periods, when low temperature or insufficient water limited growth, should be more carefully studied with a view to finding what treatments or management practices could be applied to their improvement. He also emphasised the necessity for studies being carried out under conditions as near to those under stock grazing as possible, since most pasture herbage is "harvested" by the animal as a succession of small crops throughout the year.

The influence of this approach has resulted in a good deal of emphasis being placed on the study of techniques of measuring yields by using the mower and scales but with the maintenance of the influence of defoliation by the animal and the return of the important high nutrient-containing excreta as occurs under normal grazing management in this country.

In addition a wide range of other problems referred to in this article has been investigated.

The results of the investigations are of inestimable value to farmers and advisory officers and have done much to guide practices in grassland management throughout New Zealand. Despite the fact that there has never been a resident scientific officer at Marton—a serious handicap*—this research is in the forefront of world scientific studies on grasslands, and much of the credit for this must go to the conscientious and accurate work of various overseers and technicians who have carried out the instructions of the scientific personnel concerned.

[* **Direction of Marton Area:** As Professor Hudson has indicated, there has never been a resident scientific officer at Marton. General technical supervision has rested with the officer supervising field experiments of the Farm Advisory Division (now P. B. Lynch, Wellington). The present technical officer in charge at Marton is A. Thompson. Administrative supervision is the responsibility of the Fields Superintendent, Palmerston North (A. Stuart).]



The practicability and value of mowing as a means of measuring pasture production all the year round had to be established before money became available for extension of the work. Mowing was therefore done for the first year or so with a hand mower with a covered grass catcher. Later this was replaced by the motor mower.

Nitrogen Trials

A number of trials with nitrogen have shown that in most circumstances not more than 1 to 2 cwt per acre of water-soluble nitrogenous fertilisers (of about 20 per cent nitrogen content) are worth applying to pasture. At this rate it does not matter which type of water-soluble fertiliser is applied.

Nitrogen must be applied when clovers do not produce much feed, that is, from late autumn to early spring, and they must be applied when it is not too cold or wet for grasses to make reasonably good growth. It is no use putting nitrogen on low fertility pastures almost devoid of grasses capable of making good growth during the cool season. Nitrogen at moderate amounts was shown to be most useful for ryegrass seed production, but excessive amounts led to lodging.

Potassium and Urine

Gradually Marton become potassium deficient. A most interesting study concerning both potassium and nitrogen was carried out with cow urine. It was shown that 90 per cent of the nitrogen and 80 per cent of the potassium contained in urine may be lost as far as pasture uptake is concerned over a period of two and a half years. More work on the apparent disappearance of potassium will be carried out.

Interaction of Plant Nutrients

A well balanced programme of pasture topdressing is one of the most difficult things to determine. A complicated trial at Marton has shown just how important it is to have everything right so that each nutrient applied is effective to the greatest degree. For instance, it was found that potassic fertiliser gave much better results on pasture well limed and supplied with adequate sulphur. In spite of quite marked potash deficiency it was not worth putting on potash without sulphur and lime. It also appeared that heavy liming increased the phosphate content of pasture herbage and made it possible to use less phosphate. These are only a few results from this interesting experiment which has shown the possibilities of studying fertiliser element interaction in other parts of New Zealand.

Pasture Fertility Work of the Future

One of the greatest services to the farming community will be provided by sound information on the rate and ratio of fertiliser dressings needed to maintain reasonably good pastures.

After many years of topdressing with superphosphate the phosphorus supply of the soil gradually increases, but there may still be a need for sulphur, and potassium deficiency is almost certainly growing in area and intensity. These fertility changes are modified by the type of farming. Marton is therefore planning to investigate soil fertility needs on private farms. It is hoped that property owners will cooperate in providing facilities for these vital investigations.

TECHNIQUE INVESTIGATIONS

One of the important activities at the Marton Experimental Area has been the development of techniques for experimentation with pastures and crops.

Pasture Production Measurement

When A. W. Hudson began his investigations into pasture production he found that methods of measuring pasture production then used were quite inadequate. The main difficulty was to measure grass growth **under natural grazing conditions.** Hay yields did not give this information and Hudson soon found that simple "mowing only" techniques where the mown herbage was discarded and where stock did not graze the experiments soon led to serious sward deterioration.

Hudson's "mowing and grazing" technique was the first significant advance in this field. The whole story is explained in "Technique Employed in Grassland Research in New Zealand", Bulletin No. 11 of the Imperial Bureau of Plant Genetics: Herbage Plants, published in 1933. Hudson used paired fields, measurements being taken from plots in one field while its "twin" was being grazed, and grazing and mowing were alternated to give continuous production records.

The main weakness of this technique was found to be "transference of fertility" by stock grazing the plots in a common enclosure. Subsequent

A group photographed at the Marton Experimental Area in 1934. From left to right: E. Bruce Levy (now Sir Bruce Levy), A. W. Hudson (then Crop Experimentalist), Lord Bledisloe (then Governor-General), W. B. Wards (then Overseer of the Area), and Major R. Wilson.

studies at Marton and at the Rukuhia Soil Research Station led to the development of two main techniques to overcome this: (a) "Mowing only and clippings returned" for small-plot trials in the absence of grazing and (b) the "frame" or "cage" technique for grazed fields whereby stock are temporarily excluded from small caged areas in grazed fields and production is measured on these areas. The "mowing and clippings returned" technique has been found to give reliable measures of fertiliser responses while maintaining the desirable pasture species in the sward.

Developments and refinements of these techniques have occupied much of the work at Marton so far. Studies are now in progress of the effects of heights and frequencies of cutting and of methods of returning nutrients and/or clippings.

A detailed study of the nutrients that are removed in mower clippings throughout the year is now being made. Work has included studies of the efficiencies of different types of mowers for this research.

Early (1930) grass weighing and sampling facilities at Marton were primitive but effective.

Crop Production Measurements

Crops are easier to measure than pastures. Usually only one yield is measured each year and there is no complication from grazing. This does not apply with some grazed forage crops, however, and technique studies have been made on these crops on lines similar to those on pasture.

Crop technique investigations at Marton have included the most efficient size and shape of plots for different crops, sampling studies, the effects of border rows and of competition between neighbouring plots, the effects of thinning and plant populations, and problems of securing samples for dry matter and chemical analysis.

Soil Analysis

Only a minute fraction of the soil in a paddock is subjected to chemical analysis when a soil test is taken. The problem of securing a truly representative sample, particularly under grazing, has been one of several technique studies of soil sampling at Marton.

TRIAL DESIGN

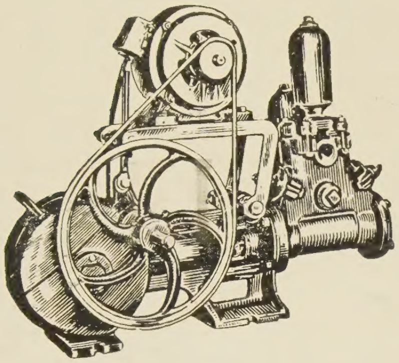
In 1910 nobody worried much about the design of an experiment. It was not until the revolutionary work of Sir Ronald Fisher at Rothamsted Experimental Station, England, that agricultural experimentation in the field was placed on a sound basis. The publication of his book "Statistical Methods for Research Workers" in 1925 gave rise to radical changes in the methods of field experimentation and to the realisation that good design is the foundation for a successful experiment. The implications of all this were felt at Marton, and the continuing advances in the subject of experimental design have been applied there soon after they were published.

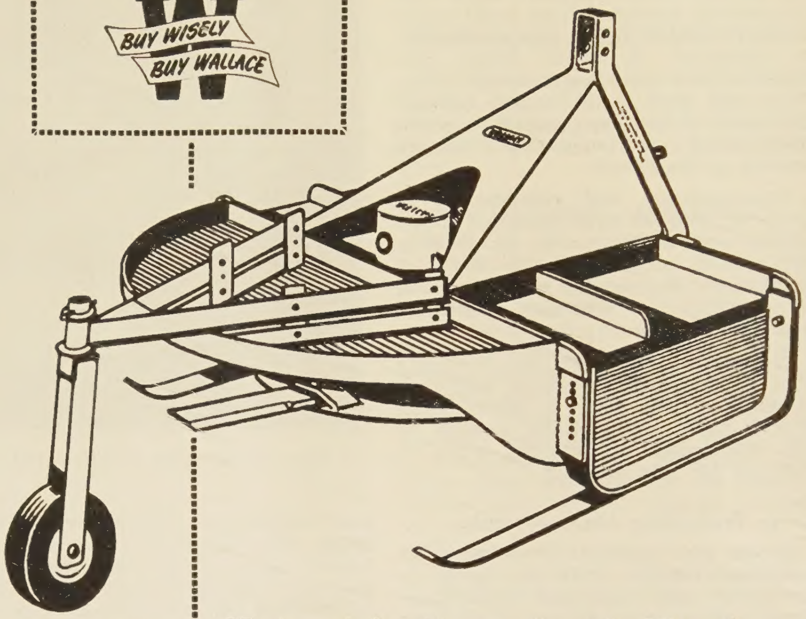
The first experiments at the Marton Area were of the simple type of one plot of each treatment. For instance, cereal trials reported in volume 3 of the "Journal of Agriculture" mention a trial with 19 varieties of wheat from which yields were taken. There were 19 plots, some of half an acre and some of one-eleventh of an acre. This type of design was used in many trials for another 10 to 15 years. It is a reasonably satisfactory design only when the differences between treatments are huge. The reason for this lies in the natural variability of all fields. If any paddock of the same variety is harvested, say, in acre sections, the yields of each acre would be different, sometimes markedly so. Therefore apparent differences in a trial on any

Close-up view of one of the first pasture trials at Marton (sown about 1926). It was a simple half-paddock trial comparing Dutch white clover (left) and Canterbury white clover (right). The Dutch white clover died out after the first year and was replaced by volunteer grasses.

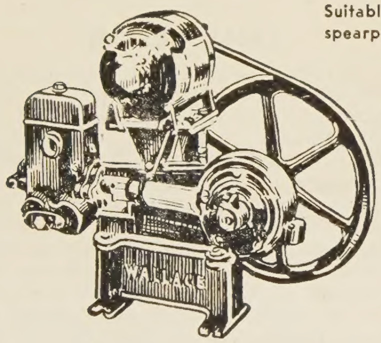
BUY WISELY — BUY WALLACE

BUY WISELY BUY WALLACE





PLENTY OF WATER with a 'POWERFLO'



Suitable for pumping from wells, spearpoints, springs, lakes, streams or rivers. Pumps up to 750 gallons per hour. Available with or without 60 or 90 gallon tanks. Positively automatic—self-starting, self-draining, self-lubricating and self-stopping.

We have the right pump for every purpose on your farm. Write now for full information without obligation.
All prices F.O.R. Auckland.

WALLACE "WELCO" MK. II FORAGE HARVESTER

For silage-making, green-crop feeding, hay conditioning, mowing and topping. The ideal machine to harvest and handle any pasture or grass crop. The ideal unit for N.Z. conditions, and well within the H.P. range of the average farm tractor. Write for details.

£298/-/-

D. McL. WALLACE
LIMITED

HEAD OFFICE: NEWMARKET, AUCKLAND.
P.O. BOX 9010, NEWMARKET. PHONE 52-079.

BRANCHES AND AGENCIES THROUGHOUT NEW ZEALAND

Make 'short' work of Weeds, Bracken, Fern, Gorse, etc.!

Make every acre more productive. A WALLACE Rotary Slasher will be one of the hardest-worked, most valuable implements on your farm.

WALLACE ROTARY SLASHER NOW IN THREE MODELS

SUPER MODEL

For the heaviest clearing jobs. Adjustable skids, full 5ft. wide cut. Renewable knives. **£167/10/-.** With land wheel, as illustrated, for extra rough conditions, **£194/10/-.**

STANDARD SKID MODEL

For grass and weed clearing, mulching, etc., on uneven country. 4ft. 6in. cut. **£134/10/-.**

STANDARD MODEL

Fully suspended, for operation on level ground. 4ft. 6in. cut. **£119/10/-.**

D. McL. WALLACE LTD.,
P.O. Box 9010, Newmarket, Auckland.
Please send details of WALLACE SLASHERS ☐
POWERFLO ☐ FORAGE HARVESTER ☐

NAME ....

ADDRESS ....

....

Please mark X if required for School Project ☐

such paddock might merely be due to naturally occurring soil variation among different parts of the field.

Replication

The first attempt to overcome this defect was by putting down more than one set of treatments. This is known as **replication.** In the mid twenties replication came into use in trials at Marton, but it was with Hudson's "mowing and grazing" technique trials about 1928 that replication became general for most trials. It also became very substantial. Thus a trial of 1928 had 18 replications of treatments, with 24 control plots, giving a total of 168 plots to be mown. On the other hand, the size of each plot was reduced, so that the area required for a trial did not increase.

Replication overcame some of the difficulties of the earlier type of trial, but it was not on its own a firm scientific basis from which exact statements regarding the effects of treatments could be made. Some attempts were made to apply some methods of statistical analysis to results from these trials, but in the trial mentioned above Hudson stated: "Results have not been subjected to statistical analysis because of the large amount of work involved."*

In the trials of this period treatments were applied in a systematic pattern (Fig. 1). A considerable controversy was raging in the statistical world at that time on whether plots should be laid down in systematic or in random order. New Zealand workers were at this time supporters of the "systematic" arrangement, but the battle went clearly to the "random" advocates. In the late thirties the change was made and from that period various types of random designs have been used at Marton (Fig. 2).

The advantage of the random design, and the statistical analysis which follows from it, is that it allows exact probability statements to be made. The inherent plot to plot variation is, of course, still there, but now it can be **measured**, and this allows us to calculate whether observed differences are in fact due to treatments or whether they may have arisen from the natural variability over the trial area.

Since 1945 there have been numerous advances in experimental design, and many of these have found application at Marton. A well designed experiment will produce the information required with the minimum effort. Improvements in design have made it possible to get information that would otherwise have been impossibly laborious to obtain.

"Fractional Replication"

Probably the first successful trial in New Zealand to use Finney's principle of "fractional replication" was begun at Marton in 1952. In this trial seven fertilisers were applied alone and in most combinations to pasture. The trial occupied 64 plots and it gave information on responses to each fertiliser and, in addition, information on the way in which the response to one fertiliser was affected by the presence of another fertiliser. A number of these "interactions" were discovered in this trial, which has been reported on fully elsewhere.

S Mg B P Mo L	B L	Mg K P L	B K P Mo	S Mg B K	S P	Mg Mo	S K Mo L
Mg L	Mg K P Mo	B Mo	S P Mo L	S Mg B K Mo L	S K	S Mg B P	B K P L
B K	S Mo	S Mg B K P Mo	B P Mo L	Mg P	Mg K Mo L	S K P L	S Mg B L
Mg P Mo L	B K Mo L	S Mg B Mo	S K P Mo	B P	S L	S Mg B K P L	Mg K
S Mg Mo L	S B	P L	Mg B K L	S B K P Mo L	Mg B P Mo	S Mg K P	K Mo
Mg B Mo L	Mg B K P	S Mg P Mo	K P Mo L	S Mg K L	S B K Mo	S B P L	NIL
S Mg P L	K P	Mg B K P Mo L	Mg B	Mo L	S B K L	S Mg K Mo	S B P Mo
S B K P	S B Mo L	Mg B Mo K	S Mg	P Mo	S Mg K P Mo L	K L	Mg B P L

Fig. 2—The layout of a complex trial in which "fractional replication" was used and which was laid down in 1952 at Marton. This trial included low (or nil) and high rates of the seven factors P (double superphosphate), L (lime), K (muriate of potash), Mo (sodium molybdate), Mg (magnesium carbonate), S (sulphur), and B (borax) in 64 plots. Half of all the possible combinations of these factors were used. Symbols on the plan show the factors used at the high rate; factors included in the plots at the low rate are not shown.

The second example is the use at Marton in 1960 of one of Box's composite designs. In this trial four fertilisers on potatoes were tested and 60 plots were used. The striking thing about this design is that each fertiliser was applied at five different rates. The design enabled a "response curve" (Fig. 3) to be drawn for each of four fertilisers, which related yield of potatoes to the rate of fertiliser applied.

Particularly in the last 10 years have new trial designs on various crops and pasture been experimented with at Marton with the aim of developing methods to improve the efficiency of experimental work throughout the country.

1	2	3	3	2	1	1	2	3	3	2	1	1	2	3	3	2	1
NIL	S/AM	S/AM + LIME	S/AM + LIME	S/AM	NIL	NIL	S/AM	S/AM + LIME	S/AM + LIME	S/AM	NIL	NIL	S/AM	S/AM+LIME	S/AM+LIME	S/AM	NIL

Fig. 1—A typical early systematic trial design. This was a trial laid down in 1929 at Marton with treatments (1) no nitrogen, (2) 2 cwt of sulphate of ammonia, and (3) 2 cwt of sulphate of ammonia plus 4 cwt of lime.

---

* "Investigations into Pasture Production", Bulletin No. 31, Department of Scientific and Industrial Research.

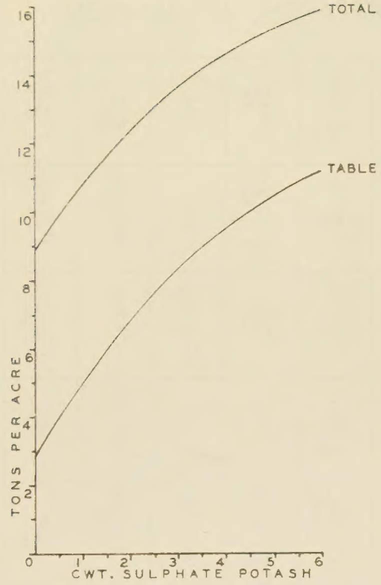


Fig. 3—The "response curve" for rates of potash on potatoes from a recent trial at Marton. This trial compared five rates each of lime, phosphate, potash, and nitrogen. The curves show the increasing yields of table and total potatoes with increasing rates of sulphate of potash. Potash gave the most marked responses in this trial.

WEED CONTROL RESEARCH

The short history of weed control research at Marton reflects new techniques, new ideas, and the realisation that pastures are a living, changing environment. Weedkillers bring about more rapid changes than the grazing animal and in more recent years they have been used to make changes comparable to that of cultivation. To study these changes collectively more detailed work has been done at Marton than at any other centre in New Zealand.

In 1948 the first weedkiller trial at Marton was laid down. This experiment attempted to measure the effect of removing low fertility weeds from a low fertility pasture. The weedkillers were effective in killing weeds, but pasture production slumped partly because of the loss of production from weeds and partly because the weedkiller used seriously retarded the already inadequate amount of clover present. This trial was quoted as evidence against the use of weedkillers on pasture.

Possibly as a result of this no further work with weedkillers was undertaken until 1953. By this date it had been shown that weeds such as barley grass, docks, some thistles, and buttercups were weeds of high fertility pastures and were increasing with the very practices aimed at improving production. TCA was showing promise for the control of barley grass. What was the effect of TCA on pasture grass? Pure sowings of perennial and short-rotation ryegrass, cocksfoot, and timothy were made. The trial was not wholly satisfactory, but did show that pasture grasses were sufficiently resistant to TCA for this material to be used for barley grass control.

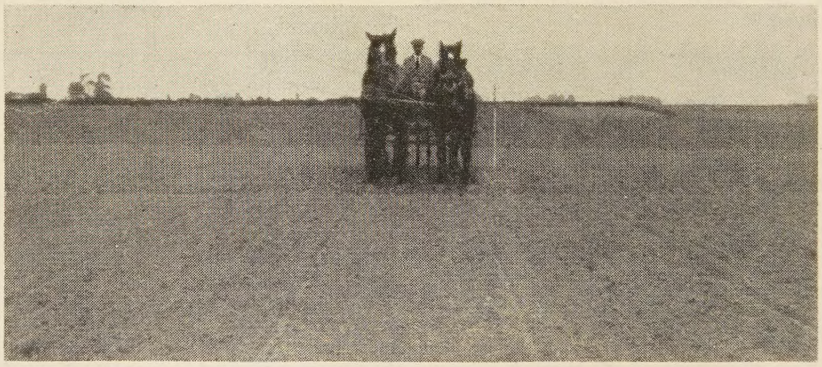
Effect on Clovers

In the same year the effect of MCPA, 2,4-D, and dinoseb on red, white, and subterranean clover was determined. This work showed that MCPA and 2,4-D were damaging to young clover and that 2,4-D should not be used on red clover at any stage. An attempt was made to measure the effect of 2,4-D applied on short and long white clover, but it was not until this work was done with the grazing animal that a significant effect in favour of short-grazed clover was shown, indicating less damage to clover if it is sprayed in this condition.

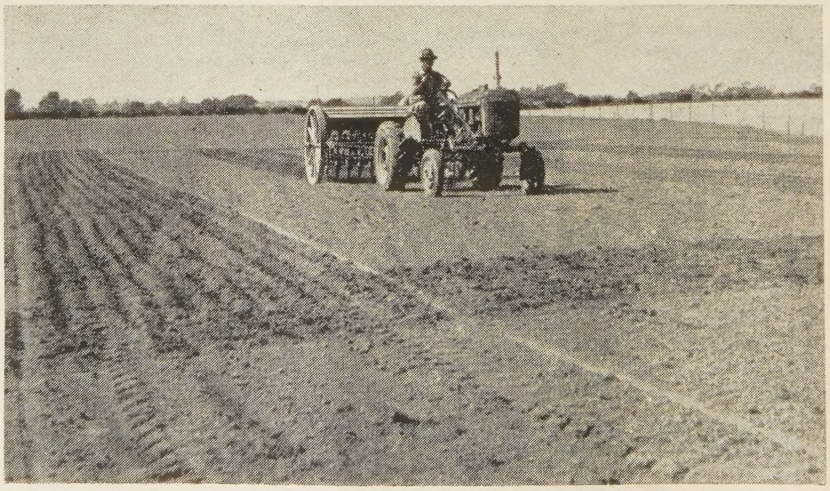
Once the effect of MCPA and 2,4-D on clover was known, it was possible to undertake technique trials to determine the effect of clover on pasture production and the tolerance of clover to weedkillers applied at various times of the year. Clover proved most resistant in late winter and summer, periods of the year when it is normally making sufficient nitrogen for its own requirements. In spring and late autumn clover damage resulted in pasture deterioration.

Subsequently this work was repeated with MCPB and 2,4-DB, but these materials showed such little detrimental effect (except 2,4-DB on red clover) that their use could be recommended at any time of the year.

In 1957 "chemical ploughing" trials were introduced and to date 12 such trials have been conducted. These have shown that brassicas may be established successfully provided they are drilled or sown when adequate soil moisture is present. Parallel with this work, pasture species tolerance trials have been undertaken comparing the effect of 2.2-D ("Dalapon") and paraquat applied at various times of the year. This work has shown that paraquat may be the key to the successful commercial application of chemical ploughing in New Zealand.



A contrast in methods of drilling crop trials at Marton. The photograph reproduced above was taken about 1926 and that below in 1947.



PASTURE SPECIES INVESTIGATIONS

Pasture species work started in 1918. The first experiments compared a few imported varieties of pasture species with some locally available varieties.

From these small beginnings the work rapidly expanded and in the decade beginning in 1930 a very extensive programme of varietal testing was conducted. Since then investigations have been mainly concerned with problems of grassland establishment and management and the evaluation of special-purpose pasture mixtures.

Before 1930 the experiments consisted of large plots with little or no replication. Observations and an occasional hay crop were the main methods used for evaluation. From mid 1930 measurement trials were conducted. Plots decreased in size, but replication was increased.

In recent years several methods of botanical analysis have been used to estimate the species composition of the various species mixtures. Species under trial have been sown in separate paddocks and each sward has been managed to suit its special requirements. This is in contrast to the early work where usually the whole area of the trial, no matter how many different species were included, was grazed as one unit. Under these conditions marked differences in palatability of the species often affected their performance.

The first pasture species experiment to be laid down at Marton compared the production of a lucerne stand with that of a temporary pasture of Italian ryegrass and cowgrass. In the following year (1919) a simple trial comparing two lucerne varieties, Grimm and Marlborough, was started.

Clover Variety Trials

In 1923 the first of several white clover variety trials was begun, and in the next three years many comparisons of imported varieties and local varieties were made. Kentish wild white clover was a superior variety in these trials, being a most persistent type and forming a dense sward. Subsequent work has indicated, however, that it is much less productive than New Zealand bred varieties.

Trials with red clover varieties began in 1926. Late flowering types such as Montgomery red clover were compared with the varieties usually at the disposal of the farmer in those days. The late varieties were shown to have a longer growing period and a denser habit of growth.

A few small plot sowings of a variety of pasture species were made about this time. These sowings included species such as browntop, prairie grass, meadow fescue, *Poa trivialis*, two Danish varieties of cocksfoot, *Paspalum compressum*, *Phalaris tuberosa* var. *stenoptera*, *Lotus pendunculatus* (major) and suckling clover. No species was particularly promising.

[*Barry Woods*

Power mowers used in a series of trials this year at Marton to compare their efficiencies. The trials were conducted in cooperation with Consumer Service.

Testing Ryegrass Varieties

Ryegrass varieties were tested for the first time in the 1926-27 season. This trial was a very simple one in which half the area was sown with old pasture Hawke's Bay ryegrass and the remaining half with Canterbury ryegrass. The Hawke's Bay ryegrass was a much superior strain, being very persistent in contrast to the short-lived Canterbury ryegrass.

In 1929-30, 15 acres were laid down under the care of E. Bruce Levy (then Agrostologist to the Department of Agriculture) in a ryegrass variety trial. This trial consisted of 620 plots of varieties selected from the chief seed growing districts of the North and South Islands. It demonstrated the value of true perennial varieties, compared with non-persistent false perennial and Italian types, and was one of the first steps that led to the breeding of the pedigree ryegrasses as we know them today.

In the 20 years from 1930 much experimental work at Marton compared different New Zealand bred and introduced varieties of the common pasture grasses and clovers. Superior varieties were tested under grazing conditions. This work was done in cooperation with the Grasslands Division of the Department of Scientific and Industrial Research.

During recent years the pasture species work has been more varied. Special-purpose pastures such as cocksfoot and red clover; short-rotation ryegrass and white clover; meadow fescue, cocksfoot, and clovers; and prairie grass, cocksfoot, and clovers have been evaluated against a standard perennial ryegrass sward. The effect of spelling on pasture production and the effect of length of period of grazing on a ryegrass sward have been examined. Pasture establishment trials have compared rates of seeding with high and low levels of fertiliser.

An experiment now in progress compares ryegrass varieties and includes a newly bred variety from the Grasslands Division. This is one of a series of similar trials throughout New Zealand.

Pasture species work will always form an important section of the work at the Marton Experimental Area.

FUTURE OF MARTON AREA

The Marton Experimental Area is on a soil type (Marton loam, a yellow-grey earth) typical of a very large area of "terrace" soils that extend along the west coast of the North Island from Wanganui south. No other agricultural research station for soil, pasture, and crop investigations exists in the southern half of the North Island. Marton therefore fills a very important place in the research station network.

However, the area of land available at Marton is limited and the reuse of trial sites which this restricted area has made necessary in recent years should be avoided where possible, particularly in soil fertility research. The expansion of the Area or the establishment of a new Station cannot be delayed indefinitely. In the meantime, however, valuable work is in progress and, in addition, it is hoped to use Marton as a base from which to do soil research on farmers' properties.

The history of 50 years of research at Marton reflects the changing patterns of agricultural development in New Zealand over that period. No doubt the future will see further changes. Few other research stations can point to such solid achievements in past years and there is every confidence for similar or better results in the future.

Care of Livestock during December

By Wallaceville and Ruakura Animal Research Stations

WEANING LAMBS

WEANING immediately after the first main draft of lambs has many advantages. The lambs not drafted can be given the pick of the feed available without having to compete with the ewes. The ewe flock in one mob can be used effectively for pasture control. Shearing is much less complicated and more feed can be made available for fattening cattle.

COWS RETURNING TO THE BULL

If cows are returning to service, the mating records should be examined to see if any particular bull is to blame. If so, a veterinarian or Livestock Instructor should collect a semen sample for examination. Care is necessary when a replacement bull is bought, and if possible, it should be a young bull that has not been used previously. A bull should never be bought in the saleyard unless his full history is known.

Washing out cows seldom helps and may cause trouble if irritant fluids such as kerosene are used. It pays to consult a veterinarian as soon as the cows are noticed returning to service in unusual numbers; he cannot be expected to diagnose the trouble months later.

LEPTOSPIROSIS IN CATTLE

Infection with *Leptospira pomona* can cause abortion in cattle and redwater in calves. Both of these diseases may be prevented by vaccination of the pregnant cow. Cows vaccinated early in pregnancy and again about two to four weeks before calving may be protected against this particular type of abortion and at the same time protection may be conferred on the calf against redwater through the colostrum. A veterinary surgeon should be consulted to establish a diagnosis of leptospirosis and to undertake control measures.

FOOT ROT CAN BE ERADICATED

This is the season in which plans for the eradication of foot rot must be made and farmers should follow the Department's published recommendations or seek advice from the Department's nearest office.

VACCINATION OF CALVES AGAINST CONTAGIOUS ABORTION

Though the vaccination of calves against contagious abortion is now widely accepted as a routine procedure, some farmers are surprisingly still unaware of it. The usual method of vaccination is the injection of 5 c.c. of vaccine under the skin of the neck or behind the shoulder, where the skin is slack enough to accommodate a large volume of fluid without undue tension. The treatment is given when the calves are between four and eight months of age. Poor immunity results from vaccination before this age.

The immediate after effects of vaccination are slight. Some calves are a little off colour for a few days and occasionally cold abscesses form at the site of inoculation, but if left alone, they will disappear, leaving a lump which also gradually decreases.

Vaccination bookings should be made early through a Department of Agriculture officer or veterinarian, as a heavy programme starting in January and February has to be arranged.

PIG PRODUCTION

Litters farrowed in December should be fed to produce pork rather than bacon while milk supplies are still available. This avoids the need to sell pigs as stores in early winter, usually at a loss. Feed suckling sows 4½ gallons of milk plus 1 gallon for each pig suckled. At weaning feed the pigs 1½ gallons of milk plus ½ lb of meal daily. As the pigs grow, gradually increase the milk fed and reduce the meal so that at one month after weaning the ration consists entirely of separated milk.

SUMMER FEEDING OF THE DAIRY HERD

Low levels of production at this time of the year, often followed by premature drying off, may well be due to poor wintering and underfeeding immediately after calving rather than to a shortage of good quality feed during summer. In consequence on many farms it may be difficult to justify the feeding of silage as a supplement to summer pasture. This is especially the case where such a practice jeopardises the supply of reserves for winter and thereby lowers the overall carrying capacity of the farm.

In districts which frequently experience a dry summer, and on farms which tend to dry out unduly, low production at this time of the year can best be overcome by growing a special crop or by early calving.

DAGGY LAMBS

To maintain the highest possible standard of hygiene in the handling of our meat, the cooperation of every farmer is essential. Lambs should either be crutched at least three weeks before drafting, or where this has not been done, dirty lambs must be dagged before leaving the farm. At drafting lambs must be held in the yards for a few hours to allow them to empty out before being trucked to the works.

Seasonal Notes

By Farm Advisory Division

HARVESTING OF RYEGRASS SEED

RYEGRASS seed crops are now almost invariably harvested with the header harvester after the crop has been cut and windrowed, but a light crop may be direct headed. With direct heading, however, every precaution must be taken to see that the seed does not heat. Even though it is fully mature when harvested, it is not fit for tight bagging.

A seed crop for windrow harvesting is cut at an earlier stage of maturity than for direct heading: when all trace of greenness has gone from the seed. Sweeping a hat through the crop to collect a few seeds still seems to be the best way to find if a crop is ready for cutting.

Windrowing may be done with either the binder or the mower, the binder being more commonly used in the South Island and the mower in the North. If the mower is used, it is customary to have an inside divider to confine the crop in a swath of even density. Under normal conditions windrowed crops condition fairly readily, but if short-rotation ryegrass or Italian ryegrass is threshed too soon from the windrow, the seed tends to heat in the bags. The seed is easily threshed, but header speeds must be low and the concave fully open. Damaged seed can easily result from inaccurate settings and too fast a drum speed.

Straw of both Italian and short-rotation ryegrass, if baled immediately behind the header, can make good hay. If the crop is heavy, baling is the best way to remove the straw, which, if allowed to lie, can cause deterioration of the sward by causing death of plants and consequent ingress of weeds.

—J. G. RICHARDS, Oamaru

* * *

SPRINGTAIL DAMAGE IN BRASSICA CROPS

MANY patchy strikes in brassica crops are attributed to poor germination when in fact the cause is damage by springtails. Patchy strikes are typical of springtail damage. The germinating shoot may be attacked before it emerges from the ground or the first two leaves may be bitten off as soon as the seed case has dropped. In either instance the impression is of a poor strike, because the only evidence remaining is the bare stump of the shoot at or below ground level.

The cotyledons and four-leaf stage of the plant may be attacked and here the damage is characterised by a scalloping of the edge of the leaf and a pinhole effect in the body of the leaf. Under normal conditions once the plants have passed this stage they usually grow fast enough to be unaffected by further attacks.

The springtails themselves are pinhead-sized, globular insects that range in colour from orange to dark green. Their springing habit makes them difficult to see, but when they are present in large numbers they will readily land on the open hand.

The essential part in control of springtails is early identification of the damage, as in four or five days a large proportion of a paddock can be destroyed. Daily inspection of the crop over the germinating period is essential. At the first signs of damage the crop should be sprayed with ½ lb of lindane per acre. This one spraying usually gives quite adequate control.

—B. J. McSWEENEY, Timaru

* * *

HARVESTING OF WHITE CLOVER

THE white clover seed crop is a valuable one and warrants particular care and attention at harvesting. The crop should be cut with a mower when at least three-quarters of the flower heads have browned off and seed can be freely rubbed out, and the remaining flowers are beginning to turn colour. The swath should be no bigger than the harvesting machine can conveniently handle.

If the mower width is greater than 5 ft, the two shedder boards may confine more material than is desirable for the efficient drying out of the crop. However, the density of the crop and the type of header used will dictate the width of the cut. The most important factor is to obtain a swath of even density, not one that is thin on the edges and heaped in the centre.

Threshing with the header should be done in warm, dry conditions conducive to a real brittleness of the seed heads. As all headers have their own peculiarities, a machine of known capabilities should be used and the maker's instructions regarding speed and drum settings followed.

—J. G. RICHARDS, Oamaru

* * *

TOPPING OF PASTURES

MAINTENANCE of an even balance of grasses to clovers in a sward under variable seasonal conditions cannot be easily achieved by stock alone if there are not enough of them for the fields being grazed.

Even with a portion of the farm closed for hay or silage dairy stock are often unable to cope with all the feed produced. As a result seed heads and rank growth develop in the early summer with a consequent reduction of high quality milk-producing clover and grass. Paspalum with its rampant summer growth is a particular offender in this respect and, if left uncontrolled, will soon dominate the sward by eliminating competition from other pasture plants. In a few seasons ryegrass and white clover may no longer exist, a situation leading inevitably to a sod-bound condition of the paspalum, which limits its production and the production of any other species which may have survived in the pasture.

The mower or harvester can fill a valuable role by trimming or topping rank growth to prevent its smothering clover below and to prolong fresh, even growth of grass through summer and autumn. Regular topping of pastures also has the advantage of preventing undesirable grasses, such as sweet vernal and Yorkshire fog, from seeding and spreading.

Timing of topping is important on land liable to dry out in summer; on most land it should be done before the end of December to allow regrowth to provide a cover. In a season of heavy summer rainfall paspalum on fertile land may require topping even to the end of March.

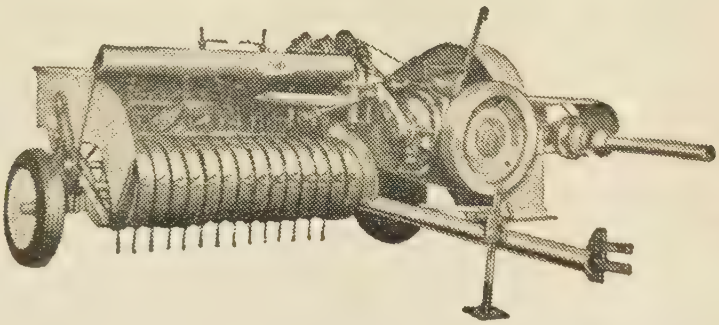
—H. McM. BULL, Auckland

IN ADDITION TO ENGINE FUNCTIONED LONG 48 AND B.L. 48 BALERS . . .

Bisley's
BETTER *Farm* MACHINERY

. . . Now Present

FURTHER ADDITIONS TO THE BISLEY RANGE OF BALERS



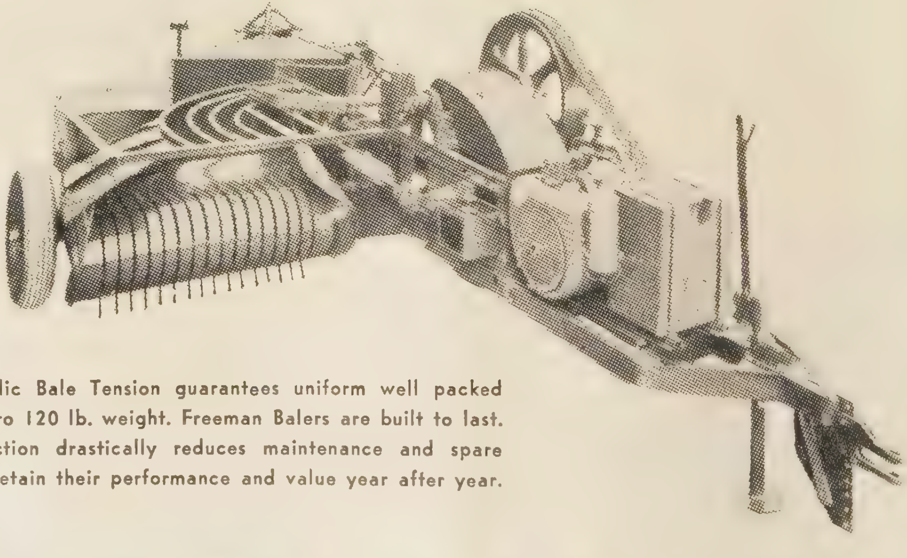
The P.T.O. Bisley Model 350 Automatic Pick-up Baler (made in U.S.A.). (Many parts are interchangable with the Long 48.) Capacity up to 10 tons per hour.

For the Contractor

THE BISLEY FREEMAN BALER (made in U.S.A.)

Most Durable High Production Baler in the World

Mr. D. M. Verity, Contractor, of Te Awamutu, advises, with his first FREEMAN BALER, which is still operating, he totalled 480,000 bales of hay over 9 seasons of operation. Maintenance amounted to £197 over the 9 seasons.



Automatic 4-way Hydraulic Bale Tension guarantees uniform well packed bales adjustable from 60 to 120 lb. weight. Freeman Balers are built to last. Rugged, durable construction drastically reduces maintenance and spare parts costs. Bisley Balers retain their performance and value year after year.

A. M. BISLEY & CO. LTD.

WARD STREET, HAMILTON **ANTIGUA STREET, CHRISTCHURCH**

Branches at Te Awamutu, Morrinsville, Te Puke, Whakatane, Rotorua, Christchurch and Timaru.

DISTRIBUTORS IN ALL MAIN TOWNS

Beef and Veal from Dairy Farms

DESPITE illustration by the Ruakura Animal Research Station in recent years of the possibilities of increased beef and veal production latent in the New Zealand dairy industry, crossbred beef production has not been attempted to any marked extent by dairy farmers. A still expanding dairy industry may face increasing difficulties in disposing of its conventional products, and J. C. Gerring told the Ruakura Farmers' Conference in June that, with the outlook brighter for beef than it is for butter, a welcome and necessary addition to farm income was being overlooked. An adaptation of his paper follows.

A REPORT by P. [illegible] to the Ruakura Farmers' Conference in 1954 dealt with the suitability of the Aberdeen Angus-Jersey crossbred animal for veal production. It showed that by bucket feeding on skim milk, calves of this cross produced carcasses dressing about 140 lb at 18 weeks from birth.

Crossbred Animals for Chiller Beef

At the 1956 conference Dr C. P. McMeekan dealt with the suitability of the same cross for chiller beef production. Representative carcasses were shipped to England as an individual use of chillers and were very favourably reported on by an experienced panel of judges. Dr McMeekan suggested that by mating 40 per cent of our dairy herd to beef bulls and taking the progeny to an average dressed weight of 500 lb we could produce another 175,000 tons of beef a year. At present prices this would earn over £20 million in overseas funds.

At the 1958 conference Miss D. E. K. Walker told of a comparison she had made between the crossbred progeny of Aberdeen Angus, Hereford, and Shorthorn bulls when mated to Jersey cows. The chiller beef carcasses of these were again shipped to Smithfield for criticism by trade experts and again evoked very favourable comment.

Reasons for Dairy Farmers' Indifference

Despite these experiences the practice has not been adopted to any marked extent by dairy farmers. Several reasons have been suggested. First, prices for dairy produce in 1958 rose higher than even the most optimistic could have reasonably expected. More recently, however, they have shown a substantial and persistent fall. Today the payout is well above market realisations, a situation which cannot continue indefinitely. Second, the rearing of extra heifers for herd replacements rather than for beef has been a profitable enterprise during the period concerned. Third, there is apparently

▼ Some of the million and a half surplus calves that are slaughtered every year as "bobbies" at New Zealand meatworks. They represent an untapped potential for beef production in the dairy industry.

fight sheep loss from intestinal worms with fast acting TARTAN 'FENODREN' phenothiazine drench

The exclusive "Colloidal Reduction" process developed by Farm Chemicals Co. can reduce particle size to less than 1/8000 of an inch. This process is used in the manufacture of fine grade TARTAN 'FENODREN'.

TARTAN
Fenodren
CONTAINING 57% w/v PHENOTHIAZINE
LIQUID PHENOTHIAZINE DRENCH FOR CONTROL OF INTERNAL PARASITES IN SHEEP CATTLE AND HORSES
MANUFACTURED BY
Farm Chemicals Company
PORT MAPUA
NELSON
5 GALLONS

It is an accepted fact that fine particle chemicals have a faster and more effective action.

Keep your flocks healthy—drench them with TARTAN 'FENODREN' liquid phenothiazine.

More effective because they're finer

TARTAN

FARM CHEMICALS

Manufactured by FARM CHEMICALS CO., NELSON.

Distributors: (North Island) SUMMIT PRODUCTS LTD., Palmerston North.
(South Island) A. S. PATERSON & CO. LTD., Nelson, Blenheim, Christchurch, Timaru, Dunedin, Invercargill.
SOUTH ISLAND CHEMICALS LTD., Christchurch.

a prejudice against crossbred animals. It is said by some that in an adverse season such animals suffer a check from which they take a long time to recover and that under such conditions they will not produce a good carcass.

The crossbreds referred to by Dr McMeekan at the 1956 Conference were early weaned at eight weeks and then suffered a check in the long summer drought of 1954-55. Yet at just over two years of age their carcasses dressed out from 570 to 670 lb and were considered eminently suitable for the chiller trade by our potential customers.

Yield of Lean Meat Important Factor

Some are quite firmly convinced that no crossbred animal could produce a carcass with a decent conformation under any conditions. Such an opinion ignores the radical changes which have taken place in the last few years in the processing of our meat. In 1955-56 only 39 per cent of all the beef and veal exported to the United Kingdom and North America, our two largest markets, was classed as boneless. In that same year we exported 23,000 tons of chiller beef. By 1958-59 the proportion of boneless beef and veal had increased to 76 per cent, and our exports of chiller beef in carcass form had dropped to a mere 397 tons. Such changes make it obvious that the yield of lean edible meat has become a much more important measure of an efficient beef-producing animal than any fancy points of conformation.

Difficulties in Raising Crossbred Animals

The fourth reason is undoubtedly the most important. This is that there are too many practical difficulties in producing suitable crossbred animals. It has been suggested that 60 per cent of the herd should be mated to dairy bulls to provide heifers for herd replacements, and the remaining 40 per cent to beef bulls. The possibility that more than the normal percentage of cows may return to service and the possibility that an undue proportion of bull calves may be born deter some farmers from taking the risks involved. Where these risks are taken there is a tendency for most of the crossbred calves to be born late, and farmers from experience know that late-born calves are more difficult to rear after weaning.

Place for Artificial Breeding

Such difficulties could be overcome by using a Friesian bull through the artificial breeding service instead of one of a beef breed. This may be one of the reasons for the increase from 3 to 14 per cent in artificial breeding matings to Friesian bulls in the last few years. Under such a scheme all but the late calves could be reared, the heifers for herd replacements for either a dairy or beef breeding herd and the steers for veal or beef production. Under this system most of the calves kept for fattening would be steers, and the fact that steers grow appreciably faster than heifers would be an additional advantage.

One of the 20 sets of twins used in a trial at Ruakura in which one member was fed every other day from one to two months and the other was fed daily. The animals are just under a year old and weigh 460 lb.

The hybrid vigour of the crossbred heifers will increase the per animal production of both milk and butterfat. This increase could be expected to be enough to more than offset any lowering in butterfat production per acre as a result of running larger animals. Additional advantages would arise from the increased fertility of these hybrids and a lower calf mortality among their progeny. Such advantages could be maintained by alternate crossing with bulls of the Friesian and Jersey breeds.

Overseas trials indicate that under comparable conditions the straight Friesian steer compares favourably with those of the beef breeds in growth rate. Such experience suggests that a high level of feeding is required. Because of their high content of lean meat their carcasses are readily acceptable to the trade. It is hoped that Ruakura will soon provide similar information on the Friesian-Jersey cross.

Advantages of Beef Production

Whatever the true explanation may be for the lack of interest in the production of meat from dairy farms, the fact remains that to maintain our present standard of living we must earn more overseas funds, and the outlook for beef is brighter than it is for butter.

The production of crossbred beef or veal has a number of features which make it an attractive proposition.

Very little extra finance is needed. The raw material, in the form of one and a half million surplus calves, is bred each year. Most farmers have adequate facilities for rearing and handling calves.

It is one form of animal production which involves very little labour. Today the rearing of calves is a simple, straightforward streamlined job. From the time they are four to five days old they can be fed once a day; at Ruakura they have been successfully reared by feeding only once every second day between one and two months old.

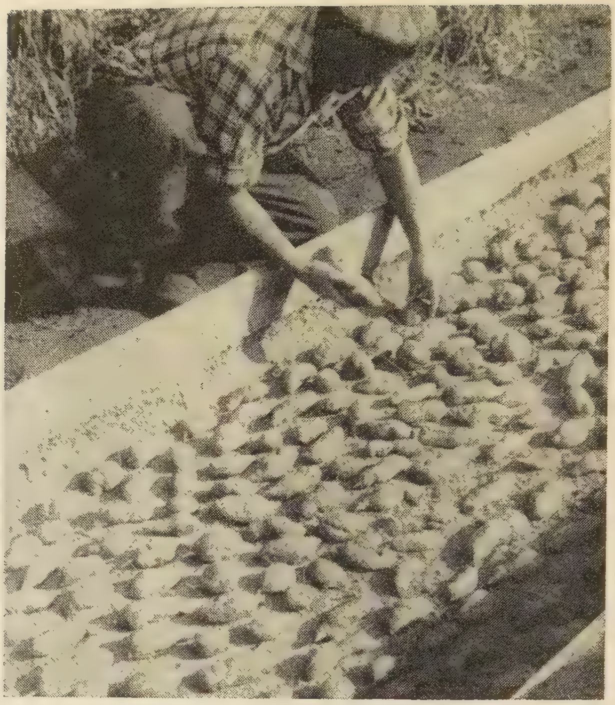
Provided high-quality pastures are available, the calves can be weaned at about eight weeks of age. Even this amount of effort can be almost entirely avoided by suckling the calves on cows which for various reasons are difficult to milk. Most of these cows will make a good job of rearing at least three calves.

Adoption of such a practice could serve to ease the present difficult labour problem on many farms. It is an enterprise which calls for no major change in farming policy, nor the acquisition of any new skills. The returns for the additional capital invested and labour expended are high. As a method of taking up the untapped production potential on a large proportion of dairy farms it could provide a welcome and necessary addition to farm income without further embarrassing the export dairy products supply position.

Kumara Seed Lines Can be Improved

- By Plant Selection
- By Use of Vine Cuttings
- By Strict Hygiene

By G. J. WILSON,
Horticultural Advisory Officer,
Department of Agriculture,
Pukekohe



MANY growers have quite the wrong idea of what is a desirable kumara tuber to bed down for propagation. Far too many second-grade, small tubers are used because they are cheap, but such a practice can only bring about gradual degeneration of the line. If the aim is to improve crop yields and quality, tubers used for next year's crop must come from high-yielding, disease-free plants.

THIS year many growers have obtained nucleus stock of the variety Owairaka Red from the Department of Agriculture, Auckland. This variety has been selected now for a number of years and only the best seed saved. Growers should aim at continuing this programme and to do the job properly the seed required for next year's hotbed should be dug by hand to rogue out any poor-yielding roots. Selection should be on a plant basis for quality and yield rather than on individual tubers. Only healthy first-grade kumaras should go back into the propagating bed, not rejects.

Vine Cuttings

For a complete seed improvement programme the grower should go further than just root selection by using the method of growing from vine cuttings to control soil fungous diseases such as black rot and scurf.

Black rot is at present the most serious threat to kumara growing in New Zealand, and since it cannot be controlled by ordinary spraying, a programme of strict hygiene and maintenance of a disease-free line for seed purposes is necessary.

Scurf causes a skin blemish which is much less serious than black rot, but it detracts from the appearance of the tubers and will cause shrinkage in store.

Black rot and scurf are carried over from season to season either through use of affected tubers in progagation or on old kumara tuber and plant remains in the field and hotbed.

Each year the grower should aim at producing for his next year's crop sufficient seed which he knows to be disease free. With black rot and scurf, normally only the parts of the plant below soil level are attacked and the disease cycle can be interrupted by taking cuttings from vines of established plants and setting them out in clean ground.

The programme of taking vine cuttings is started when the earliest field plantings have begun to run and have made shoots 18 to 24 in. long. About 6 to 8 in. of the tips of such runners are cut off and are immediately planted out in the same way as transplants in ground that is known to be free from black rot or scurf.

The vine cuttings should then produce plants free from these diseases, since they are known to attack in the field only those parts of the plant below ground.

Early Planting Desirable

It is usually desirable to make the early planting in a sheltered position to get enough growth in the first plantings to make vine cuttings before December. The earlier cuttings can be taken the better, but provided they are planted out by early December, they should produce satisfactory seed tubers. The vine cuttings may have to be nursed along, especially in the early stages, as they need to be kept well watered until a good root system has been established.

The resultant crop from the vine cuttings is the one that should be specially selected at harvest for the next year's plant production.

With either disease the vine or sprout cuttings must go into new ground or ground that has not had kumaras for several years.

Once clean stock has been obtained strict hygiene must be practised, especially with the propagating beds. Repeated use of the same soil and equipment for the propagating bed is probably the chief means of distributing kumara diseases. Details of the recommended hygiene procedures may be obtained from the local Horticulture Division office.

If growers adopted a programme as outlined, no doubt many seed lines at present grown in New Zealand could be considerably improved.

CROPPING WITHOUT CULTIVATION
DEPT OF AGRICULTURE

Fallowing and Chemical Crop Establishment

AN investigation into the effects of fallowing and the application of nitrogenous fertiliser on crop establishment where the chemical ploughing technique is used is outlined in the following article. This investigation should be regarded purely as an exploratory experiment. No attempt has been made to give any specific recommendations based on the results obtained, because obviously more trial work needs to be done. These results do, however, confirm that comparable benefits accrue from the age-old practice of fallowing land, whether it is associated with cultivation or the use of chemicals. The trial was conducted with the assistance of R. G. Warren, Farm Advisory Officer, also of the Department of Agriculture, Dannevirke.

By L. W. BLACKMORE,
Farm Advisory Officer,
Department of Agriculture,
Dannevirke

HEADING PHOTOGRAPH: Site of the chemically established cropping trial at Matamau, where the importance of fallowing was investigated.

Conclusions Drawn from Trial

- For successsful crop establishment with **chemicals** there must be sufficient reserves of plant nutrients in the soil to allow the crop to establish rapidly so that it can gain supremacy over any seedling and pasture recovery growth. The use of nitrogenous fertilisers at sowing is unlikely to give the crop this supremacy on medium to low fertility cropping areas, except possibly at uneconomically heavy rates.
- Inducing clover dominance in a **chemically treated** sward so as to create a ready source of nitrogen for the crop to draw on and to suppress weed growth does not appear to be a practical approach to the problem, as the competitive effect of the clover during the establishment stages of the crop is far too severe.
- The fallowing of chemically treated turf is similar in its effects to the fallowing of cultivated land. However, experience to date suggests that fallowing on medium to low fertility cropping land where **chemicals** are used may be even more important than on cultivated land because of a greater temporary drop in the supply of available plant food in the seedbed zone.
- Fallowing after the application of **chemicals** on medium to poor cropping land is likely to result in marked increases in yields and also give responses to comparatively low applications of nitrogen.
- Where **chemicals** are used and the fertility is high there are likely to be sufficient nitrogen reserves in the soil to satisfy both the bacteria and the crop. Under such circumstances "spray-seeding" (spraying and sowing in one operation with use of non-residual chemicals) would appear to have distinct possibilities.

OWING to the release of plant nutrients resulting from bacterial breakdown of the soil organic matter the fallowing of worked ground on medium and especially low fertility land usually results in substantially increased yields.

Where chemicals are used to produce a seedbed it is usual to wait about a fortnight before sowing the seed. The reason for this delay is to make sure that all residual effects have gone. On fertile soil the prospects for a successful crop are good, but under medium and especially low fertility conditions the chances of success, even though the initial strike is good, are greatly reduced.

Trial at Matamau

To throw more light on the problem a trial was established during the 1960-61 season on medium fertility flat land (Takapau silt loam) on the property of Mr G. R. Dassler, Matamau. The pasture selected was in a run-out state and consisted of browntop, perennial ryegrass, flatweeds, white clover, suckling clover, and moss. The area had been grazed by sheep and

Calfhood vaccination prevents contagious abortion . . . . All heifer calves *need protection* against contagious abortion . . . . the Department of Agriculture recommends that every heifer calf should be vaccinated. Consult your veterinarian or livestock instructor as early as possible.

TVL and animal health

TASMAN VACCINE LABORATORY LIMITED P.O. BOX 29, UPPER HUTT

averaged about ½ in. in height at the time of spraying.

Portion of the area was sprayed on 6 October (54 days before sowing), 7.4 lb of 2,2-D (equivalent to 10 lb of "Dalapon") and ½ lb active ingredient of amitrol in 24 gallons of water per acre being used. A second portion of the trial was sprayed on 14 November (16 days before sowing), identical quantities of chemical and water per acre being used.

On 29 November (the day before sowing) about half of the previously sprayed area was cross-sprayed with a powerful desiccant called diquat applied at the rate of 4 lb a.i. in 24 gallons of water per acre. Within 24 hours this spray had completely burnt off all seedling and recovery growth that had come in during the fallow. This resulted in a virtually clean seedbed for sowing.

Overdrilling on fallowed turf. →
Diquat was applied the previous day to clean up seedling and pasture regrowth.

Crops Grown on a Chemically Prepared Seedbed

Garden peas and turnips six weeks after sowing. **Left:** Greenfeast peas. **Right:** York Globe turnips.

Chou moellier six weeks after sowing. There is dead turf between the rows and little regrowth.

Maize and peas nine weeks after drilling. **Left:** Marigold maize. **Right:** Greenfeast peas.

Lucerne and millet. **Left:** Lucerne. **Right:** Japanese millet. Only half a drill width of each was sown.

Tomoana
FULL-FEED
DOG
CRACKERS

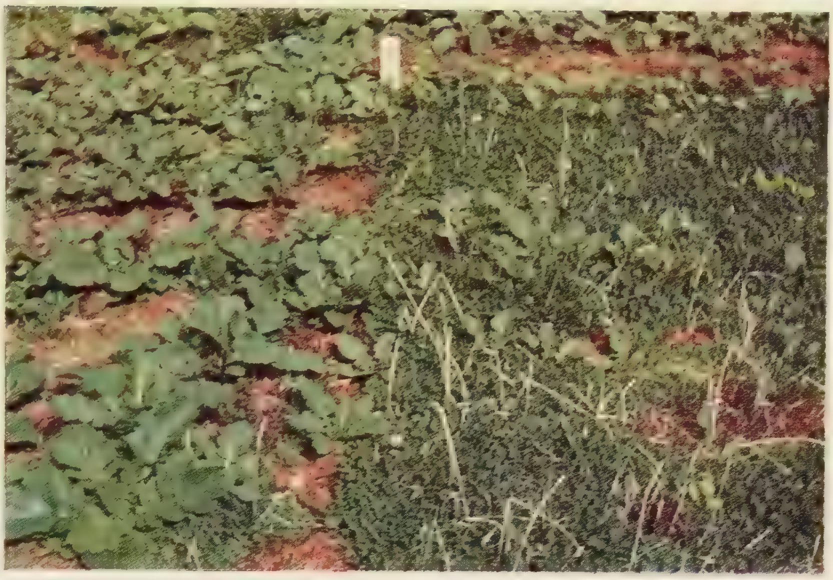
Proved by actual Trials

TOMOANA FULL-FEED DOG CRACKERS ARE ALL THAT WORKING DOGS NEED

IT'S PROOF on the farm that counts, and widespread farm tests of long duration with Tomoana Full-Feed Dog Crackers have proved conclusively that dogs not only relish them, but also accept them as a **complete** food on which they will work with full alertness and vigour.

This completely new type of food—completely sterilised—is enriched with livermeal, and weight for weight, has a much higher food value than meat. Clean, easy to feed, and lasting indefinitely, farmers everywhere are finding them the ideal food, and a major factor in the drive to eliminate Hydatids. Drovers swear by Tomoana Full-Feed Dog Crackers. Write to W. & R. Fletcher (N.Z.) Ltd., Box 594, Wellington, for Free Leaflet giving full details . . . or ask your Merchant.

Tomoana FULL-FEED Dog Crackers



Clovers suppress crop. **Left:** 2,2-D 3.7 lb (equivalent to 5 lb of "Dalapon") plus $\frac{1}{4}$ lb acid equivalent of amitrol per acre has removed both the grasses and clovers from the original sward. Note particularly the much larger turnips. **Right:** 2,2-D 3.7 lb per acre has removed the grasses only, leaving the clovers. Observe how this clover has suppressed the young turnips.

The farmer ploughed the remainder of the paddock about a month before sowing, and part of this worked land was included in the experiment for comparative purposes.

On the following day the area was overdrilled with a hoe coulter drill fitted with grassland tips specially fitted with adjustable points to give deeper penetration. The soil was of a free nature and under the moist conditions prevailing penetration was very good. The area was chain harrowed immediately after overdrilling to cover the seed.

The following per acre rates of seed were sown:

York Globe turnips		1 and 2 lb
Sensation and Calder swedes		1 lb
Chou moellier		3 and 5 lb
Marigold maize	..	2 bushels
Greenfeast peas	..	3 bushels
Japanese millet	..	25 lb
Lucerne ..	..	15 lb

All crops received a basic rate of 2 cwt of serpentine superphosphate per acre, but the maize and portion of the turnips received 1 cwt of an ammonium nitrate-lime mixture in addition. All fertilisers were drilled in with the seed. Plots of turnips (1 lb per acre) and chou moellier (3 lb per acre) were drilled in on the cultivated section of the trial on the same day.

The strike of all crops on the double-sprayed section was rapid and even and it was soon obvious that the plots sown at the higher rates were far too thick. In fact the turnips and swedes would have been much better if sown at the usual rate of about 12 oz per acre and the chou moellier at about 3 lb per acre, but the higher rates were included because these had given better results in previous trials.

The good strikes obtained were due to even coulter penetration, the almost complete absence of seedling and recovery growth, and the "desert-like" conditions during the long fallow period which were quite unsuitable for slugs and surface insects generally. Though there was also a comparatively good strike on the once-sprayed section, unevenness in plant numbers and in establishment occurred at an early stage because of strong competition from seedling growth and pasture recovery that had occurred during the fallow. The strong contrast in regrowth between the once- and the twice-sprayed sections of the trial is clearly shown in the accompanying illustrations.

There was a good strike of chou moellier on the cultivated section of the trial, but the turnips were a little on the thin side.

Effects of Fallow

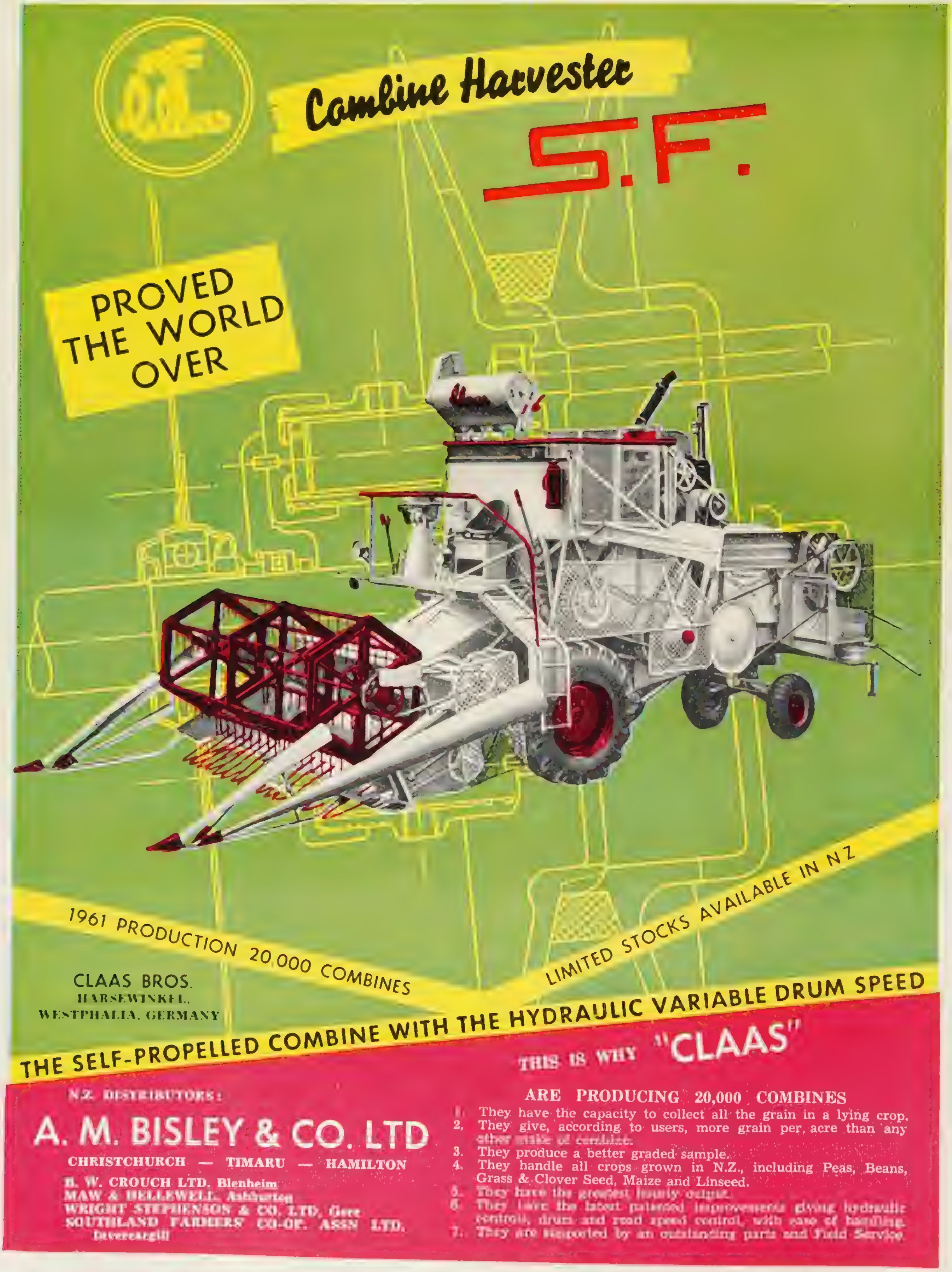
Chou Moellier

From about four weeks after sowing differences between the short and long fallows began to show up clearly. The chou moellier on the short fallow was much more poorly developed, with

Coping with Regrowth after the Long Fallow

Left background: Regrowth on the 54-day fallow section that was not sprayed with diquat before overdrilling. **Right background:** This section was sprayed with diquat 24 hours before overdrilling. This was most effective in burning off unwanted vegetation. **Foreground:** Portion of the cultivated ground.

View of the trial area six weeks later. **Left:** Here regrowth and weeds have gained supremacy and have severely suppressed the crop. **Right:** In this resprayed section there is an almost complete absence of regrowth or weeds.



Combine Harvester

S.F.

PROVED THE WORLD OVER

1961 PRODUCTION 20,000 COMBINES

LIMITED STOCKS AVAILABLE IN N Z

CLAAS BROS.
HARSEWINKEL,
WESTPHALIA, GERMANY

THE SELF-PROPELLED COMBINE WITH THE HYDRAULIC VARIABLE DRUM SPEED

N.Z. DISTRIBUTORS:

A. M. BISLEY & CO. LTD

CHRISTCHURCH — TIMARU — HAMILTON

H. W. CROUCH LTD. Blenheim
MAW & HELLEWELL, Ashburton
WRIGHT STEPHENSON & CO. LTD. Gore
SOUTHLAND FARMERS' CO-OP. ASSN LTD.
Invercargill

THIS IS WHY "CLAAS"

ARE PRODUCING 20,000 COMBINES

1. They have the capacity to collect all the grain in a lying crop.
2. They give, according to users, more grain per acre than any other make of combine.
3. They produce a better graded sample.
4. They handle all crops grown in N.Z., including Peas, Beans, Grass & Clover Seed, Maize and Linseed.
5. They have the greatest hourly output.
6. They have the latest patented improvements giving hydraulic controls, drum and road speed control, with ease of handling.
7. They are supported by an outstanding parts and Field Service.

Fallowing and the Effects of Nitrogen on a Chemically Prepared Seedbed

Effect of fallowing on chou moellier. Photograph taken six weeks after sowing. **Left:** 16-day fallow. **Right:** 54-day fallow. The crop on the left has established more poorly, has paler leaves, and has more dead turf through it than the one on the right.

Effect of fallowing on turnips. **Left:** 16-day fallow; yield 20.9 tons per acre. **Right:** 54-day fallow; yield 46 tons per acre.

Effect of nitrogen on short fallow. **Left:** No ammonium nitrate-lime mixture; yield 20.9 tons per acre. **Right:** Mixture at 1 cwt per acre; yield 20.4 tons per acre. The mixture at 1 cwt per acre has had no effect on yield.

Effect of nitrogen on long fallow. **Left:** No ammonium nitrate-lime mixture; yield 27 tons per acre. **Right:** Mixture at 1 cwt per acre; yield 36 tons per acre. The mixture has had a substantial effect on yield in this case.

a distinct paleness in the leaves, and contrasted sharply with the better developed and darker green appearance of the crop on the long fallow. Comparative weights of the green crop were taken from adjacent plots on 23 May, the results being:

16-day fallow ..	**11.0 tons per acre**
54-day fallow ..	**20.0 tons per acre**

Turnips

Differences between the short and long fallows began to show up after a few weeks and became progressively more marked as time went on. The leaves were paler on the short fallow and the bulbs much smaller. Comparative weighings from adjacent plots were:

16-day fallow ..	**20.9 tons per acre**
54-day fallow ..	**46.0 tons per acre**

The average yield of turnips in the cultivated section was 46.3 tons per acre. These plots were, however, not adjacent to the above two treatments, so that too much emphasis should not be placed on the comparison.

Effects of Nitrogen

Part of the turnip crop was sown with an ammonium nitrate-lime mixture. The effect of nitrogen on the short and long fallows was strikingly different.

Short Fallow (16 Days)

The use of the ammonium nitrate-lime mixture at the rate of 1 cwt per acre had no apparent effect on the vigour or yield of turnips established on the short fallow area. The results were:

No nitrogen ..	**20.9 tons per acre**
With nitrogen ..	**20.4 tons per acre**

The most likely explanation for the nil response to nitrogen is as follows. With the chemical method the seedbed becomes a dead mass of actively rotting turf in which the sown seed has to strike and establish. The bacteria rotting the turf are strong competitors for available food supplies and if nitrogenous fertilisers are applied, they utilise these unless the fertility of the soil is high enough to supply their immediate needs. In the results given above it appears that virtually all the applied nitrogen must have been taken up by the bacteria. Had larger amounts of the ammonium nitrate-lime mixture such as 2 cwt or 3 cwt per acre been applied, there may have been a surplus left over for the turnips, but these rates are not likely to be a payable proposition. Such large amounts, if drilled in with the seed, would almost certainly cause germination injury, and the indications are that broadcast applications would encourage undesirable pasture regrowth.

Long Fallow (54 Days)

The effects of nitrogen on the long fallow are revealing. The results were:

No nitrogen ..	**27.0 tons per acre**
With nitrogen ..	**36.0 tons per acre**

Here the use of nitrogen has had a substantial effect on yield. This is probably explained as follows. During the 54 days of fallow a good deal of rotting would have taken place and as a result there would have been a considerable reduction in bacterial numbers. The applied nitrogen would therefore be largely taken up by the crop at this stage and would therefore increase yield.

Weight Comparisons

None of the weights given above has been statistically examined. Unless otherwise stated they give the comparative yields between adjacent plots. The differences were, however, most marked in all cases and were very obvious to the eye, as shown in the accompanying illustrations.

Pure Clover as a Seedbed for Crops

The theory has been advanced that the growing of crops in pure clover

(Continued on page 433)

NEW ZEALAND'S BIGGEST SELLING AGRICULTURAL PUMP . . .

HYPRO PUMPS

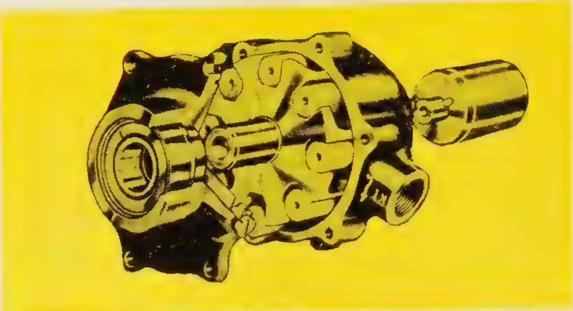
presents an ever increasing range

THE HYPRO BIG AND SMALL TWIN PUMPS ARE DESIGNED WITH ALL SPRAYING JOBS IN MIND.

PISTON PUMPS
BIG TWIN
SMALL TWIN

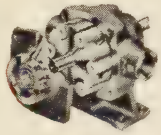
BIG TWIN:
This pump can be operated at pressures of up to 400 lbs. p.s.i. and is adaptable for a wide range of uses, including crop spraying with abrasive chemicals. The performance greatly surpasses that of heavier and more costly ones.

SMALL TWIN:
Ideal for spraying of crops using all chemicals. Operates to pressures of up to 400 lbs. p.s.i. Low horse power requirements. High revving model, low in price.

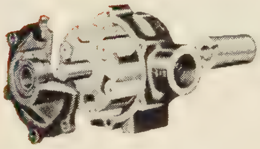


N7500.
High pressure nylon roller pump operates at 350 lbs. P.S.I. either from power take off or independent petrol engine. Little maintenance required.

N6000.
Nylon roller pump operates at pressures up to 200 lbs. P.S.I. High and low pressures for gorse or pasture spraying. Operates from power take off or independent petrol engine.



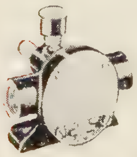
N1500.
This extremely versatile pump can handle liquids and semi-liquids and is available for countless uses in industry and agriculture.

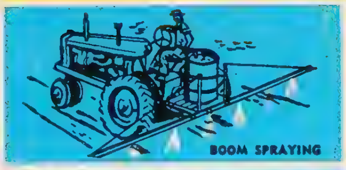


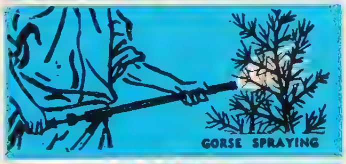
C700.
Revolutionary irrigation pump used from the power take off. 2in. pump (roller type), self priming, pumps water in high volume at pressures up to 40 lbs. P.S.I.

B610.
A really capable general purpose pump in high grade cast bronze. Working pressures of up to 75 lbs.

B12.
General purpose pump. Pumps liquids up to pressures of 30 lbs. P.S.I. Just right for home or Industrial use.







SHEEP SPRAYING

FOR WEED SPRAYING:
Designed for both high and low pressure use, the models N7500 and N6000 are most suitable for pasture spraying as well as higher pressure spraying of gorse and blackberry, etc.

FOR SHEEP SPRAYING:
Hypro Pumps are most suitable and economical for the new sheep sprayers. They provide ample pressure and volume for either Tractor or independent engine drive. For livestock spraying they have the pressure to drive the spray material through the hair or wool and thoroughly cover the hide.

All the above pumps are incorporated in **SENTRY SPRAY EQUIPMENT** as complete Models.

AUSTRALASIAN DISTRIBUTORS FOR HYPRO ENGINEERING (INC.), MINNEAPOLIS, MINN., U.S.A.

FRANK M. WINSTONE (Merchants) LTD.

AUCKLAND * PALMERSTON NORTH * DUNEDIN

P.O. BOX 2195,
AUCKLAND

Grassland Association's Award to Mr P. W. Smallfield

FORTY years after his first visit to the Bay of Plenty as a temporary assistant instructor of the Department of Agriculture, Mr P. W. Smallfield, Director-General of Agriculture, returned to Tauranga last month to attend the New Zealand Grassland Association's 23rd annual conference there and to receive the Association's award for his outstanding contribution to the betterment of grassland farming.

Mr Smallfield.

IT was not Mr Smallfield's high office alone that merited the award, said the Association's president, Mr J. W. Woodcock, but his long and abiding interest in grassland improvement generally throughout his career. The citation referred to Mr Smallfield's able leadership in pasture research and in grassland improvement, and his inspiration and encouragement of sound agricultural extension work.

Mr Smallfield, said Mr Woodcock, was one of the first members of the Association and he was proud to be making the award to an old friend and colleague whose material assistance to farming in New Zealand had been honoured also by the award of the 8th Bledisloe Medal in 1938.

Reviewing Mr Smallfield's career, Mr Woodcock said that as an instructor based at Auckland in 1921 he had urged the use of fertiliser and lime and better seed. In 1924 he was at the Ruakura Farm of Instruction teaching young men the rudiments of agriculture. In 1928 as Fields Superintendent at Auckland he had been the mentor and guide of many Departmental officers of today who would long remember his valuable advice and the way in which he taught appreciation of the value and importance of pastures.

He had done a wonderful job in developing pumice soils and it was particularly appropriate that the Grassland Association's award should be made to him in a district where he had so outstandingly made his mark.

Many would share the hope of Association members that Mr Smallfield's retirement from the Department in a few months would not mean the end of his services to agriculture; it was certain that he would never lose that interest in grasslands that he had maintained throughout his career.

Thanking the Association for honouring him with its award, Mr Smallfield said the extent of grassland improvement had been brought home to him by the introductory papers of the conference on farming in the Bay of Plenty. Listening to them he had been taken back 40 years to the time when he came to Tauranga to lecture on fertilisers and topdressing. The good pastures then that had a fair proportion of perennial ryegrass and white clover were confined to the good land of the alluvial flats and swamps. Most of the country was in sodbound pastures of Indian doab and ratstail. With "bush sickness" still troublesome in the area it could not be said that farming was very successful or prosperous.

"The changes that are evident today have been almost entirely brought about by members of this Association—farmers, research workers, fertiliser interests, and others. . . . In those days you couldn't suggest to a farmer that he should plough up his poor pastures, because there was nothing better to sow. Not until the introduction of seed certification and the availability of reliable seeds could a start be made on grassland improvement", said Mr Smallfield.

As a member of the Association he had got a tremendous lot of benefit, knowledge, and enthusiasm about grassland matters, for which he would always be grateful. His retirement did not mean that he would lose interest, as he intended to continue his membership and hoped to use the award in doing something to help grassland farming.

Grassland Assn. Officers; Future Conferences

AN invitation from the Marlborough Province Federated Farmers to hold the 24th conference of the New Zealand Grassland Association in Blenheim in 1962 was accepted at the annual conference of the Grassland Association at Tauranga in October, and the executive was asked to proceed with arrangements for the tentative dates of 30 October-2 November.

Masterton, Wanganui, and New Plymouth were discussed as possible venues to be considered by the executive for the conference in 1963.

Officers elected were: President, Mr I. L. Elliott, Rukuhia Soil Research Station, Hamilton; vice-president, Mr H. Woodyear-Smith, N.Z. Farmers Fertiliser Co. Ltd., Auckland; executive members, Messrs A. L. Dingwall, Department of Agriculture, Christchurch, N. A. Cullen, Invermay Research Station, Mosgiel, Professor T. W. Walker, Canterbury Agricultural College, Lincoln, and Mr J. Lambert, Grasslands Division, S. and I. R., Palmerston North; secretary, Mrs H. Foster, Department of Agriculture, Wellington. The immediate past-president, Mr J. W. Woodcock, Department of Agriculture, Wellington, is also a member of the executive committee.

Fallowing and Chemical Crop Establishment

(Continued from page 431)

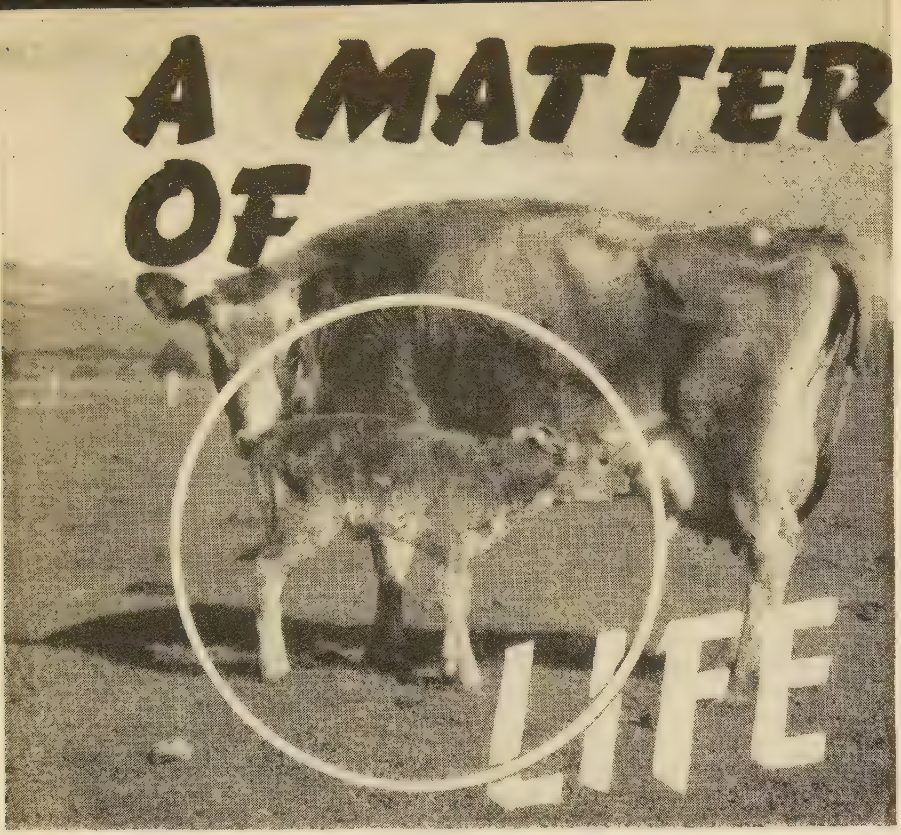
would greatly increase yields because the nitrogen released by the clover would be taken up by the crop, and the clover would also tend to suppress weed growth. This appeared to be well worth while investigating, because sound principles were involved.

In a small section of the trial not previously referred to the original pasture was changed from a grass-clover sward (the composition of which has already been described) into an almost pure white clover sward by eliminating the grasses with the grass-killing chemical 2,2-D. The rate of 2,2-D used was 3.7 lb a.i. per acre in 24 gallons of water. In an adjacent plot a similar area was sprayed with 3.7 lb a.i. of 2,2-D plus ¼ lb a.i. of amitrol per acre, the same rate of water being used. York Globe turnips at 1 lb per acre were overdrilled across these two plots five weeks later.

The relative establishments of the crop on these two plots clearly demonstrated that clover growing in association with a crop can greatly reduce crop yields. C. During, Department of Agriculture, Wellington, obtained similar results with spring-sown, but not with autumn-sown, crops.

Acknowledgments

Mr M. C. Neilsen, Tataramoa, for the use of equipment and Mr G. R. Dassler, Matamau, on whose property the trial was conducted.



VACCINATION is
SAFE
RELIABLE
EFFECTIVE

EVERY YEAR

ALL HEIFER CALVES, BOTH DAIRY AND BEEF, should be vaccinated between four and eight months old.

Vaccination is a safeguard to the health of

YOUR HERD
YOURSELF and
YOUR FAMILY

VACCINATION
AGAINST CONTAGIOUS ABORTION

ARRANGE TO VACCINATE YOUR CALVES *EVERY YEAR*
through your VETERINARIAN or the DEPARTMENT OF AGRICULTURE

FAILURE TO PROTECT BY VACCINATION

can mean

LOSS of a calf
LOSS of milk production
LOSS through infertility
LOSS through spread of the disease
LOSS through disruption of your breeding programme

Vaccination of all Heifer Calves Will Control Contagious Abortion

CONTAGIOUS abortion is a communicable disease of dairy and beef cattle caused by the organism *Brucella abortus*. It is a major cause of loss in every country in the world where cattle are farmed.

THE causal organism has been intensively studied since its recognition in 1897 and a highly effective vaccine for control of the disease has been available for the last 20 years.

Success of Vaccine in N.Z.

This vaccine was brought into use in New Zealand in 1943 and has been responsible for a marked reduction in the incidence of abortions, which previously had been as high as 10 to 14 per cent, particularly in two-year-old dairy cattle.

All cattle of any age or breed are susceptible to the disease; to control it every heifer calf between the age of four and eight months must be vaccinated every year so that a completely protected herd is built up. Until national eradication is achieved, vaccination must continue within every herd to ensure continued protection from introduced infection.

Losses Can be Expensive

The financial losses in a herd not protected by vaccination can be considerable, with up to 20 per cent of cows aborting in any one year, particularly in the "abortion storm" which is characteristic of the first wave of infection entering a herd.

Every cow that aborts means

The loss of a calf.

An average loss of one-third of the normal milk yield for that lactation.

A possible loss through infertility and secondary infection after abortion.

Continuing losses as the infection spreads through the herd, with particular effect on heifers in calf for the first time.

Further loss through disruption of planned breeding and production programmes designed to take advantage of seasonal food supplies or to keep up winter milk in town supply herds.

Spread of Infection

There is also a serious danger of infection to humans handling infected stock or drinking infected milk. In some cases infection enters the animal's udder and living disease organisms are found in the milk. The aborted calf, the afterbirth, and discharges contain millions of *Brucella* organisms, which contaminate pasture, fodder, and drinking water and spread the disease to other animals which eat or drink the infected material.

The germs are also capable of gaining entrance to an animal or human through the skin or by the eye. Infection can be spread within a herd and between neighbouring herds by dogs or vermin in contact with afterbirths or aborted calves, by cattle licking each other, in the milk, through the bull, or by bought-in infected stock.

Cows which have aborted once usually carry their calves full term thereafter, but although they apparently calve normally, they can spread the germ. Many of them are difficult to get in calf and some are rendered sterile and have to be culled.

Vaccination is

Effective.

Safe.

Cheap.

Simple to apply.

Vaccination **will**

Protect vaccinated cattle against the normal hazards of infection with brucellosis for five or more calvings.

Limit the spread of infection within a herd.

Build up a free or nearly free herd if it is used annually on each fresh crop of calves.

Prevent losses from abortions and consequent troubles.

Prevent disruption of a planned calving programme.

Avoid humans becoming infected from milk or contact with animals.

Vaccination **will not**

Introduce infection or cause abortion.

Cause any risk of organisms being secreted in the milk.

In any way render animals difficult to get in calf.

Completely eradicate or cure abortion.

Have any effect on an individual animal in calf and already infected.

Cumulative Gains

Vaccination as a weapon to control contagious abortion becomes increasingly effective in a herd as the proportion of animals vaccinated at four to eight months increases; and the protection is highest when all cattle are vaccinated as heifers and when vaccination continues as a routine annual procedure.

For worth-while results nationally, every herd, both beef and dairy, should have all heifer replacements vaccinated also as a routine. When our national herd consists entirely of animals vaccinated before they are nine months old, final eradication of the disease can be undertaken with confidence.

Apply Early

One in four dairy farmers are not yet vaccinating their heifers, although the numbers who do have been increasing every year; others are neglecting to continue vaccinating after a period of freedom from abortion. Many beef farmers have not yet become aware of the losses that can be prevented and the planned production that can be achieved so simply and easily.

Every farmer can avoid disease losses, increase profits from his own herd, and assist in achieving complete national freedom from the disease by becoming an annual vaccinator.

To be sure that they are included in the heavy programme of vaccination in January and February, farmers should make arrangements early with their veterinarian or the Department of Agriculture.

LIMING IN NEW ZEALAND

LIMESTONE is one of the oldest and most important materials used for increasing the productivity of the soil. Without it pastures often stay poor, crops do not thrive, and fertilisers, however generously applied, are often wasted. This is the first of four articles by C. DURING, Senior Scientific Officer, Department of Agriculture, Wellington, in which the use of limestone will be discussed district by district, beginning in Southland and finishing in North Auckland. An attempt is made to estimate the optimal consumption of lime in these areas and the effect that molybdenum can have on this. To obtain this information very great use has been made of published and unpublished soil surveys carried out by the New Zealand Soil Bureau and of the results of thousands of field trials with lime conducted by the Department of Agriculture. Readers should bear in mind, however, that other soil requirements (such as phosphorus, potassium, and sulphur), though important, are seldom mentioned in this article; here we are considering lime on the assumption that other deficiencies are being met.

Effects of Liming

TO understand why liming is beneficial it is necessary to discuss the action of added ground limestone in the soil. Ground limestone consists of calcium carbonate and of a variable proportion of impurities. In contact with a slightly acid soil the calcium carbonate dissolves gradually. As it dissolves it supplies calcium and reduces soil acidity or the "sourness" of the soil.

This sweetening of the soil is usually more important than the added supply of calcium.

Soil Acidity

The high rainfall over much of New Zealand continually washes plant nutrients out of the topsoil. This process, called leaching, makes soils more acid. Thus New Zealand has millions of acres of land too acid to be farmed successfully without the corrective use of limestone.

The degree of soil acidity can be measured fairly precisely and is expressed by the term pH. This is an abbreviation for hydrogen ion concentration in water. The soil pH is therefore always measured in water or more precisely in a water-soil solution.

The following table describes the meaning of soil pH in mineral soils.

pH	Interpretation
8.4-9.0	Strongly alkaline, not common in New Zealand; liming is not necessary.
7.6-8.3	Moderately alkaline, found on some lime rich alluvial flats; liming is not necessary.
6.6-7.5	About neutral, found on some fertile lime-rich alluvial soils, on saline soils, and on heavily limed soils; liming would not be of benefit.
6.0-6.5	Slightly acid, this range of pH is considered most suitable for pastures and many crops, but in their natural state most New Zealand soils are more acid than this; liming only for maintenance needs.
5.3-5.9	Moderately acid; liming commonly beneficial. Large areas of land originally had this degree of acidity.
4.8-5.2	Strongly acid; liming almost always of benefit if economically feasible. Large areas of low fertility hill country in the North and South Islands still have this degree of acidity.
4.2-4.7	Very strongly acid. Growth of useful pasture and crop species is unlikely without liming. Some Otago table lands, peats, and North Auckland gumland soils have this degree of acidity in the unimproved state.

A change of soil pH may have a profound effect on soil properties. If the soil is initially rather acid and this acidity is reduced by liming, it may lead to the following good results:

- Liming an acid soil will reduce the solubility of aluminium and manganese, both of which elements can be toxic to many agricultural plants if absorbed in excess.
- Liming an acid soil will stimulate the activity of bacteria, for instance, those which digest organic matter, with the result that the turnover of nutrients such as nitrogen is speeded up. Earthworms, too, are encouraged by sweetening a sour soil.
- Phosphatic and potassic fertilisers are often utilised more efficiently on well limed soils.
- Plants find it easier to absorb several essential nutrients such as calcium, magnesium, and potassium when the soil is not too acid.
- Liming increases the availability of molybdenum, a micro-nutrient essential for plant growth.
- The moisture holding capacity of soils is sometimes increased by liming. This may cause better growth in summer but more pugging in winter.
- The supply of calcium is increased.

On the debit side liming decreases the availability of trace elements, such as boron, iron, manganese, zinc, and copper. This undesirable effect is only of practical importance when liming has been excessive, or if soils which should not be limed have been so treated.

Lime and Molybdenum

In recent years we have seen how profoundly molybdenum can affect lime requirements. Wherever the action of lime on molybdenum availability to plants has been examined, the results have been basically similar. Liming always increases the molybdenum content of plants, sometimes a little and sometimes a great deal. The practical importance of these findings varies, however, considerably with soil type, with crop variety, and with the type of pasture.

Hill country and areas with unfavourable climate

There are large tracts of hill country in both islands and high, cold country in the South Island which are deficient in molybdenum. Without liming or without the use of molybdenum it is virtually impossible to establish clovers in these areas. Yet with either substance it can be done quite simply.

Sometimes 5 cwt of limestone per acre may be as good as 2½ oz of molybdenum. More often, however, high rates of liming would be necessary to achieve results obtained by 2½ oz of molybdenum. Thus in the initial establishment of white and perhaps subterranean and red clovers on this marginal country there is a theoretical choice between using lime and molybdenum. In practice, cost of applying lime is too high at this stage of development. Hence the discovery that many of these soils are molybdenum deficient has made their large-scale development possible. Without this valuable but cheap trace element much less in the way of development would have been done.

Though molybdenum has acted similarly to lime (or, in some instances, to basic slag) on these marginal lands, it has not reduced the total use of lime on them. This is because very little lime would have been applied in any case to these underdeveloped areas.

In almost all topdressing experiments in which molybdenum and rates of lime were compared in several combinations it was found that molybdenum alone may be as good as lime alone, but the two together give still better results. The response varies, however, with soil type. On some, limestone at 2 to 5 cwt per acre applied in addition to molybdenum gives marked pasture improvement. On other soils, usually the ones strongly acid or high in clay content, up to 10 cwt per acre is needed to obtain worth-while responses in pasture growth.

On these millions of acres of molybdenum- and lime-responsive soils which cannot be cultivated, or which have severe limitations due to climate, it is common sense to begin improvement with the use of molybdenum and the cheapest combination of fertilisers containing phosphorus and sulphur which will support reasonable clover growth. This initial pasture improvement should lead to increased net returns per acre, and so liming becomes economically feasible where the climate permits a fairly high potential production and where pastures respond strongly to lime in addition to molybdenum.

On these soils, therefore, there is no conflict between molybdenum and lime. On the contrary, the fact that initial use of molybdenum increases net returns makes possible the later use of lime on areas where its use could not be considered in the past.

Arable land slightly deficient in molybdenum

On hill country or land with low potential it is common to be content with fairly low carrying capacity and with fairly light expenditure on fertilisers. There is generally no demand for high quality pastures capable of carrying four to six sheep per acre; hence there is no demand for high soil fertility.

On ploughable land money spent on cultivation, seed, and closer subdivision calls for much better pastures. It is not just a question of building up pasture vigour and density to a point where reversion to scrub ceases to be a problem, but of building pasture with very high production, particularly during seasons of slow growth.

Experiments show that there are many sites where molybdenum appears to be as good as lime in the initial stage of clover introduction but where lime becomes necessary later to build a balanced clover-grass sward of good quality. Thus there is a clear difference in lime requirements between sites where it is desired to have reasonably vigorous clovers on uncultivated land and sites where the balance of high quality grass and clovers is to be at an optimum or near optimum.

Big winnings
with
Yorks
GUSATHION
METASYSTOX(i)
NITROPHOSKA
FOLIDOL M50
ASUNTOL

Yorks Full House

Yorks have a lot of other trump cards in their pack as well.

In addition to Gusathion, Metasystox (i), Nitrophoska, Folidol M50, Asuntol, Yorks offer you BASF Rapidnetzer Special, Tugon, Baytan, BASF Nitrogenous Fertilisers, Cupravit, Dipterex, Folidol E605, Drisan Slurry, Peasan Slurry, etc. You can have complete confidence in these products because they come from the world-famous Chemical Manufacturers, Farbenfabriken Bayer A.G. Leverkusen, Germany, Badische Anilin & Soda Fabrik A.G. (BASF) Ludwigshaven, Germany, Farbwerke Hoechst A.G. Frankfurt, Germany, and E Merck, Darmstadt, Germany. Whether you require fungicides, insecticides, fertilisers or sheep dips, Yorks have the Full House to give you a good deal.

Sole N.Z. Importers:

HENRY H. YORK & CO. PTY. LTD.
(Inc. in N.S.W.)
AUCKLAND WELLINGTON CHRISTCHURCH

Heavy, wet downs near Gore. For best results on this country lime and molybdenum are needed.

This leads to the situation where on one and the same soil type the hilly part gets only molybdenum in order to grow clover, because lime would be too expensive to apply. But the ploughable part, because it needs fairly heavy liming to get best results, does not need molybdenum at all. Heavy liming releases enough available molybdenum as well as having other desirable effects.

There are many soils which fit this example. Though they may be low in available molybdenum when unlimed, they provide enough of this micro-element when lime is applied at a rate which guarantees good vigour of pastures and crops.

Arable land, strongly molybdenum deficient

On a considerable area of soils molybdenum and lime are needed in all cases. This need is best explained by considering lime and molybdenum responses at various soil pH levels. If on these soils lime is applied to areas not treated with molybdenum, growth responses in pasture are commonly obtained until the soil pH is close to neutral (between pH 6.6 and 7). If lime is applied to soils treated with molybdenum, responses cease at about pH 6.

This means that in the past 3 to 4 tons of limestone per acre had to be applied where 1 to 2 tons would suffice today with the use of molybdenum. This fact has stimulated more intensive development of certain soils, large areas of which are in Otago, Southland, and north of Auckland. Thus there are now larger areas of these soils farmed intensively and therefore larger areas worth liming.

Lime and Clover Inoculation

Clovers germinating on infertile sites, in poor pasture, or in tussock, fern, or scrub do not usually survive for long unless infected and colonised by root nodule bacteria (rhizobia). Rhizobia penetrate the roots of the very young clover seedlings and stimulate their host plant to form root nodules. In these nodules colonies of bacteria provide clovers with nitrogenous compounds manufactured from free nitrogen from air in the soil.

On strongly nitrogen-deficient soils clover plants which do not have properly functioning root nodules develop nitrogen-deficiency symptoms, become stunted, and often die when quite young. Inoculation failure, however, is seldom the fate of every clover plant; a few nearly always acquire healthy nodules, survive, and may be growing quite vigorously.

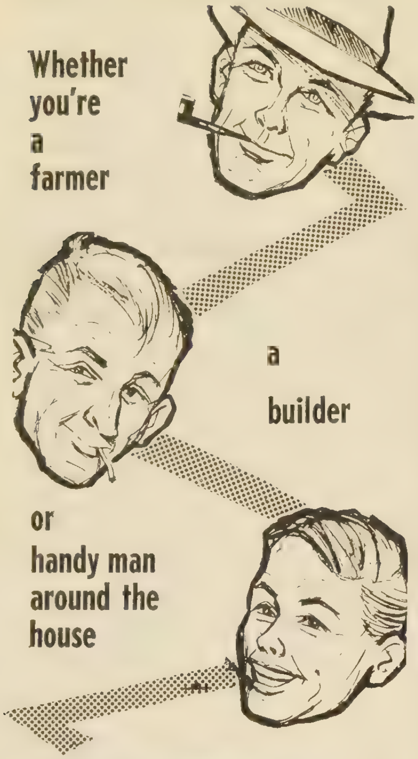
Commonly these healthy plants occur in moist hollows or on old dung pads. The intermediate picture of inoculation failure is therefore one of a few clover plants, very conspicuous by their greenness and relative vigour, among large spaces where no seedlings have survived. Fortunately clover often has a high proportion of hard seed. These may germinate in later years, and since a small proportion of these will again happen to be inoculated, the clover population may gradually thicken. The final result of inoculation failure is therefore wasteful delay in pasture improvement.

Inoculation failure in clovers is mainly a South Island problem. It is most common on light soils which are subject to prolonged droughts and fairly acid, but it is also common on soils enjoying a well distributed rainfall but strongly acid.

Inoculation failure is rare if a soil is properly cultivated, fallowed, adequately limed, and then sown to pasture. With this orthodox way of establishing pastures the use of inoculum is seldom necessary, though it is recommended as a useful insurance.

Oversown clovers which are not inoculated often establish well, even on strongly acid soils, if 10 to 20 cwt of good-grade limestone per acre is applied with or before sowing the seed, but total failure is common if no lime is used.

If the clover seed is effectively inoculated, it is often possible to obtain good establishment without lime or with very small quantities of lime. Thus inoculation of seed may save lime. The relation of inoculation to liming is similar to that of molybdenum to liming. Before inoculation was practised getting clover established by surface sowing was a very slow process on many hundreds of thousands of acres of acid hill country of the South Island. With lime it was possible to obtain good results, but liming was not always economic.



Hurricane

WIRE PRODUCTS

are at your service

- Hurricane FABRICATED FARM FENCES
- Hurricane CHAIN MESH NETTING
- Hurricane FARM, RESIDENTIAL & INDUSTRIAL GATES
- Hurricane H.R.C. WELDED REINFORCING MESH

Manufactured by

N.Z. FENCE & GATE WORKS

At Auckland, Hamilton, Wellington, Christchurch and Invercargill, and marketed by Farm Supply and Building Material Merchants throughout New Zealand.

FOR THE BEST RESULTS SPECIFY *Hurricane* PRODUCTS

FOR SHOW OR FOR SALE

MOOSE

PUTS THE BLOOM ON ALL STOCK

Farmers for nearly forty years have known that MOOSE puts a special bloom on show stock. MOOSE Linseed Oilcake Meal and Nuts are rich in protein and rich also in health-giving Linseed Oil. MOOSE tones up the whole system and gives that bloom which makes a good animal outstanding. Order MOOSE from your produce merchant.

write to:

W. & R. FLETCHER (N.Z.) LTD.,
P.O. BOX 594, WELLINGTON,
for free leaflet.

REG. TRADE MARK
MOOSE
N Z

4194

You're SAFER on a DAVID BROWN

because

1. Long wheel base. **2.** Perfect weight distribution. **3.** Low centre of gravity—all these give inherent stability. **4.** Clear visibility—you see what you're doing. **5.** Overload release—prevents tractor being pulled off balance by obstruction.

WHEEL, CRAWLER, INDUSTRIAL MODELS. PETROL & DIESEL.

DAVID BROWN 850
IMPLEMATIC

N.Z. Distributors: TODD BROS. LTD., Licensed Motor Vehicle Dealers, Wellington.

Lucerne

Among commonly grown pasture and forage crop species lucerne appears to be least able to extract sufficient calcium and molybdenum from soils somewhat deficient in these elements. Lucerne requires a particularly generous supply of available calcium for nodulation and growth and it responds to applications of molybdenum on paddocks in which most farm crops and pastures would not.

On many soils, therefore, in which limestone is not normally needed, a newly sown crop of lucerne demands lime, and where nodulation of clovers is no problem lucerne may establish best if the inoculated seed is lime pelleted.

For this reason the recommendations on liming made in this series of articles are meant to apply to pasture and forage crops, but not necessarily to lucerne.

Rate of Application of Lime on Cultivated Land

Liming is done for two reasons, to sweeten the soil and to keep it sweet. To say it in more technical terms lime is applied initially to correct acidity and to increase soil pH, and subsequently it is used to maintain the soil at or slightly above that pH.

Initial Applications

In deciding how much lime should be applied initially a knowledge of the original soil pH and the soil pH aimed for is necessary. A soil test can determine the original pH and experimental evidence can go some way in indicating the desirable pH. The bigger the gap between these two values the more lime is necessary. It would be quite wrong, however, to assume that the initial dressings of lime can be determined purely by arithmetic. Soils are too variable for this and accurate experimental data too scarce.

In practice, therefore, advice on initial rates of application of lime is based on observation, experience, and a general knowledge of principles. For instance, it is known that to obtain the same shift in pH, or the same reduction in the sourness of a soil, heavy soils need more lime than sandy soils, and those with a high organic matter content need more than those with only a low organic matter content.

Maintenance Applications

Calcium is easily removed from the soil by percolating water. The higher the rainfall and the better the drainage of a soil the more lime will be lost, other things being equal. The extent of losses of calcium from the topsoil also depends on the amount which is present in the soil. An already strongly acid soil loses little calcium in the drainage water, but if this soil is limed moderately losses will become much greater. If very heavy rates of application of limestone are made, losses will be greater still.

On soils on which lime is applied to obtain high production these losses must be made good so that the soil retains its desired degree of acidity, usually about pH 6 to 6.2.

It is necessary therefore to see that soil pH does not drop too much below this level, because this would cause a loss in production, a loss which cannot be corrected overnight, since lime is fairly slow acting.

Maintenance dressings of lime therefore need to be designed to keep soil pH above the level where losses in pasture production occur. At Marton, on a silt loam under an annual average rainfall of 40 in., it has been found that yearly application of 3 cwt of limestone per acre will keep the soil pH at about 6.1. Climatic and soil conditions at Marton are very similar to those in Southland, coastal Otago, inland Canterbury, Nelson, and many parts of the North Island. On more freely draining soils, and particularly in higher rainfall districts, it is likely that heavier annual applications are needed.

Very many farmers, however, do not apply lime annually in small dressings but every few years at a ton per acre. This alters the maintenance requirements, since if these heavy maintenance dressings are applied when they should be applied, while the topsoil is still at pH 6 to 6.2, these large rates will virtually ensure that some of the time these soils have a soil reaction close to pH 6.5 or 6.6 and losses of lime are correspondingly heavier.

There is not much precise experimental evidence on maintenance dressings requirement to keep the soil pH fluctuating between pH 6 to 6.6 by infrequent but heavy applications of limestone, but experience obtained from the soil-testing service indicates that under 40 in. of annual average rainfall on silt loams 1 ton per acre every four to five years is adequate. These recommendations are modified according to rainfall.

In this article maintenance recommendations are based on the common farm practice of applying limestone at about 1 ton per acre, but it should be kept in mind that lower rates of maintenance may be required if a lower rate of lime is applied at more frequent intervals.

Lime on Unimproved Land

On uncultivated land and hill country the initial needs of lime cannot be interpreted as readily in terms of pH as on cultivated land. Thus on sodbound pastures on soils of high initial acidity the effects of applied limestone may remain limited for several years to a very shallow layer of topsoil, the penetration of calcium being least at low rates of application.

This has two main consequences. Very light rates of application, for instance 3 to 5 cwt of limestone per acre, may raise soil pH perceptibly, but only in the top ½ in. by 0.2 to 0.3 points, which on some soils is enough to obtain a clear growth response in pasture. This small and often beneficial change in soil pH cannot be measured by the usual soil testing procedures, which take samples to 3 in. or 6 in. depth.

It has been argued that the beneficial effect of a 2 to 3 cwt application of limestone per acre is due to calcium. This could be so in some instances. Generally, however, magnesium carbonate, which does not contain calcium but raises soil pH, is just as beneficial to pasture growth as limestone on strongly acid soil said to be low in available calcium.

At higher rates of application (to unimproved sodbound pasture) the downward movement of calcium may still be extremely slow; hence the influence of applied limestone may remain concentrated in a much smaller volume on uncultivated than on cultivated ground. This may have the practical result that on the same soil type medium rates of application of limestone may be as good as high rates of application on unimproved swards, but inferior to high rates of application on cultivated land.

With general improvement of fertility the downward movement of calcium becomes much more rapid. This may be caused by an increase in the numbers of casting earthworms. Whatever the reason, however, there is a gradual change in many soils from extremely slow to much more rapid downward movement of calcium.

Our knowledge on maintenance requirements of soils is limited to those sites on which calcium moves freely down the profile.

Disadvantages of Using Lime Where It Is Not Needed

The term "overliming" calls up visions of paddocks white with lime, a large proportion of which was not needed to grow better plants or livestock. In New Zealand, where we have large areas of volcanic soils on which no lime is needed, the term overliming could be stretched to mean "the use of lime, either in large or small quantities, on soils which do not need lime to grow better plants or stock at the time of application or in the near future".

The disadvantages of using lime where it is not needed are twofold: a waste of money and possible ill effects on plant or stock health. In New

NANKOR*

The SAFE insecticide controls blowflies, lice and ked

Nankor is registered pursuant to the Stock Remedies Act 1934 for use in sheep dipping preparations.

Nankor is one of the newest organic phosphorous compounds and has proved its effectiveness in practical use in New Zealand last season.

- NANKOR is one of the most thoroughly tested insecticides ever marketed. Its versatility and effectiveness have been proved by independent research organisations on all types of livestock insect pests throughout the world.
- Tip spraying or jetting products containing NANKOR mix readily with water for easy application.

* *Trademark of The Dow Chemical Company, U.S.A.*

- Fleece dusting products containing NANKOR are simply applied by hand or machine dusters.
- NANKOR, used as directed, **is safe to humans, all livestock, dogs and domestic animals.**
- NANKOR is a product of The Dow Chemical Company, contained in "GRENOL" produced by Farm Chemicals Company, and "VETAMAC" produced by Nicholas Products Ltd.

"GRENOL" and "VETAMAC" are available from leading distributors throughout New Zealand.

DOW CHEMICAL INTERNATIONAL LIMITED S.A.
M.L.C. Building,
North Sydney, New South Wales, Australia.

YOU CAN DEPEND ON

Dow

Zealand the economic aspect is by far the more important. Many people, particularly in the South Island, still have the idea that where a little lime is good, more lime is better.

This is often not true. If there is evidence that a soil produces healthy pastures and stock at pH 6 to 6.3 and that this pH can be maintained by dressings of 10 cwt per acre every three years, there is little point in applying 10 cwt per acre annually. The greater the amount of lime applied the higher is loss of it from the soil.

There is far less evidence that overliming has done harm to crops, pastures, or stock. Liming reduces the availability of several trace elements such as boron, manganese, zinc, and sometimes cobalt and copper; it increases the availability of molybdenum; and it may reduce the uptake of magnesium and potassium in pasture plants.

In New Zealand manganese deficiency appears to be confined to wheat on small patches of soils in Canterbury. Liming has aggravated this deficiency.

Boron deficiency is common in root crops and lucerne. There is no evidence in this country that overliming has accentuated this deficiency and increased the rates of borax required for its control.

Probably certain horticultural crops have suffered from minor element deficiencies the origin of which can be traced back to the excessive or unnecessary use of lime.

There is at present, no evidence that the misuse of lime has led to trouble in livestock. On volcanic soils on which the copper content of pasture is somewhat low and the molybdenum content is relatively high liming has been suspected of creating a molybdenum-induced copper deficiency in dairy cattle. This suspicion has not been proved, but it is clear from experimental results that fairly heavy liming of several soils derived from volcanic ash could have undesirable results on the molybdenum : copper balance in the pasture.

Similarly very heavy liming is known to depress the concentration of magnesium in pasture, and this action of lime has led to the suspicion that stock health may have been adversely affected on some farms in the South Island. There is, however, no direct evidence that consistent heavy liming has led to stock ill thrift by reducing the magnesium concentrates in pastures.

Lime Maps

The maps used in this series of articles aim to indicate in a very approximate manner the geographical distribution of lime requirements. They are not accurate, since it is impossible to show in such a small scale and without colour the intricate pattern of soil groups in New Zealand. On the maps soils are grouped as follows:

Class 1: Requiring lime for intensive farming; not responsive to molybdenum.

Class 2: Flat and undulating land, slightly deficient in molybdenum, but if it is limed moderately to recommended pH, molybdenum deficiency is eliminated.

Class 3: If hilly or improved by surface sowing, molybdenum most valuable or even essential; lime not essential for clover establishment, but valuable if higher pasture production is required.

Class 4: Flat or undulating land markedly molybdenum deficient. Formerly required very heavy rates of lime; now farmed with reduced rates of lime and molybdenum.

Class 5: Strongly acid soils needing lime for clover establishment; these soils may or may not require molybdenum as well as lime.

Class 6: Soils not requiring lime.

* * *

Use of Limestone in South Island

A good example of the effect of lime is provided by a field experiment carried out by N. A. Cullen at Invermay Research Station.

The soil is one of the yellow earth group which is very deficient in available molybdenum and moderately to strongly acid (Class 4). The site selected for this experiment had never been limed. It was sown down with an orthodox clover-grass pasture mixture. Two rates of limestone (10 cwt and 20 cwt per acre) were compared and molybdenum was added two years later to all plots.

Before molybdenum was applied lime strongly stimulated red and white clover growth. After the basal dressing of molybdenum became effective clover growth improved on all plots. Now the effect of lime was mainly one of stimulating ryegrass growth.

On the plots which had not received lime, ryegrass, in spite of adequate molybdenum, did not make much growth and was gradually replaced by low-fertility grasses and by red clover.

This stimulating effect of lime on the vigour of ryegrass led to outstanding growth responses in late autumn, winter, and early spring, at a time when pasture production is at a premium. For instance, three years after application 1 ton of limestone and molybdenum produced three to four times as much feed in early spring as molybdenum alone.

This trial illustrates very clearly the importance of lime on a typical Otago soil. On these soils it is often possible to grow quite good clovers with molybdenum but without lime, but it is difficult and often impossible to obtain a balanced grass-clover pasture which grows well during the colder seasons of the year. Molybdenum therefore is a great boon to hill country on which the aerial application of lime is not economic, at least not in the breaking-in stage. On the other hand molybdenum alone is not enough on unlimed arable country which is being intensively farmed.

In the South Island therefore arable country which has been traditionally limed is still in need of lime today. On some soil types, however, use of molybdenum has reduced the need for very massive rates of application of limestone. This will now be discussed in more detail.

LIME IN SOUTHLAND AND COASTAL OTAGO

For the purpose of liming needs this area possesses four main groups of soils:

1. Those on which the amount of limestone needed has not been affected by molybdenum (Class 2).
2. Those on which molybdenum should be applied with a corresponding saving in lime (Class 4).
3. The hill soils and high country soils where lime and molybdenum may be best but where for economy only molybdenum is used with the results that some clovers can be grown where none grew before (Class 3).
4. No lime required.

Soils on which molybdenum has not affected demand for limestone

The soils in the first category on which molybdenum is of little or no importance are the free-draining downs and terraces (Mokotua and Waikiwi soils), the river flats and the peats of coastal Southland, and pockets of the more fertile river flats and downs of coastal Otago. In addition it is possible that the light semi-volcanic soils lying between Mossburn and Te Anau (a large part of which is being developed at present by the Department of Lands and Survey) come into this class.

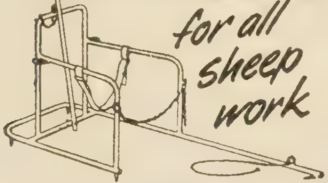
Many of these soils respond to molybdenum in their unimproved state, but moderate liming, needed to obtain balanced grass-clover swards,

ELASTRATOR
RUBBER RINGS

guarantee
QUICK,
CLEAN,
BLOODLESS

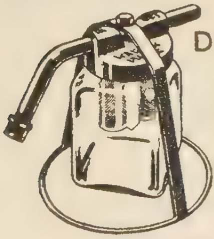
CASTRATION OF CALVES

The **HOLDEWE**
for all sheep work



FOR SAFE, EASY MOTHERING OF EWE AND LAMB

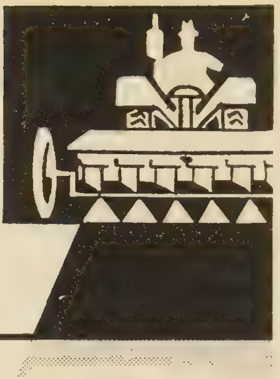
REMOVE DIRT and WATER
from
DRUM FUEL
with the
WARREN FILTER
send for
illustrated
leaflet



HYDATID -FREE !
TUX
Reg.Trade Mark
The "Dog Tucker" BISCUITS

From all Stock and Station Agents.
or direct from
ELASTRATOR CO. LTD.
Box 226, Blenheim.

A FIVE STAR BONUS IN EVERY BAG



- ★ **PHOSPHATES**
  Guaranteed 18%-22% phosphoric acid content.
- ★ **ACTIVE LIME**
  Every 112 lb. bag contains calcium oxide equal to 1 cwt. ordinary lime.
- ★ **TRACE ELEMENTS**
  Minor minerals and trace elements to correct N.Z. Soil deficiencies.
- ★ **QUICK ACTING**
  Immediate boost to pasture growth.
- ★ **LONG LASTING**
  Non-leaching even in heaviest rainfall areas.

ORDER NOW!
From your
fertiliser
merchant

BELGIAN BASIC SLAG
for better pastures and healthier stock

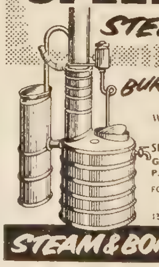
SHEEP FARMERS
Strike a 3 way blow with
WAY-BLO

for **FLY-BLOW**

- ★ destroys maggots
- ★ heals wounds in *all* animals
- ★ helps prevent fly strike

Ask your Stock and Station Agents or apply to
MACDERMOTT & DUNCAN LIMITED
Box 624, Wellington.

SPEEDWAY
STERILISER



BURNS OIL OR WOOD

Write for FREE
Illustrated Catalogue

SPEEDWAY PRODUCTS LTD.
GT. SOUTH ROAD, PENROSE
P.O. BOX 12024 *and at*
FORD BUILDINGS, COURTENAY PLACE
WELLINGTON
139 WORCESTER ST CHRISTCHURCH

STEAM & BOILING WATER

CUT SUBDIVISION COSTS !

Enquire now about

THE HUNTER FENCING SYSTEM

Write for illustrated leaflet to:—
BETHUNE & HUNTER LTD.
P.O. Box 2637, WELLINGTON.

eliminates this deficiency. The approximate area covered by these soils may be 800,000 to 1 million acres, most of which is fully developed. Some of this land has been limed rather generously, since soils of pH 6.5 to 7.0 (near neutrality) are fairly common in Southland, whereas evidence shows that pH 6.0 to 6.3 (slightly acid) is adequate for the growth of pasture and crops.

Many farms were very heavily limed in the last 10 years and these may not need maintenance dressings for some time. A soil test would help in planning the future liming programme for them. Farms which have been limed with 1 ton per acre every four to five years probably need to continue applications at the same rate. In the long run maintenance dressings of lime are needed on all farms, and a demand of some 200,000 tons of lime annually on this class of country in coastal Southland and Otago and on the semi-volcanic loams in northern Southland might fulfil long-term requirements.

Arable soils of the lowlands on which the use of molybdenum leads to a saving in limestone

Many of the poorly drained downs and terrace lands in northern Southland and coastal Otago are strongly molybdenum deficient. Examples are the Waimumu silt loam near Gore, the Te Houka and Warepa silt loams of South Otago, and the Opuha silt loams of North Otago. The stony, free-draining soils of northern Southland are believed to be similar in this respect.

On these soils, with the application of sodium molybdate every five years, pH 5.9 to 6.3 is adequate for optimum growth. Without molybdenum the pH needs to be higher, sometimes close to neutrality, before maximum pasture growth is obtained.

In practice this means that though 2 to 4 tons of limestone per acre was necessary at breaking in of virgin land, half of this amount can now be used with molybdenum. It is not known whether molybdenum has also halved maintenance requirements of limestone, but it is certain that it has reduced them, since less lime is needed to keep a soil slightly or moderately acid than to keep it near neutrality.

This highly molybdenum-responsive group of soils covers some 700,000 acres of arable land. The long-term need for lime may be in the vicinity of 150,000 to 200,000 tons per year, an amount which would allow for 4 to 5 cwt per acre per annum for maintenance as well as for some lime for further breaking in of land.

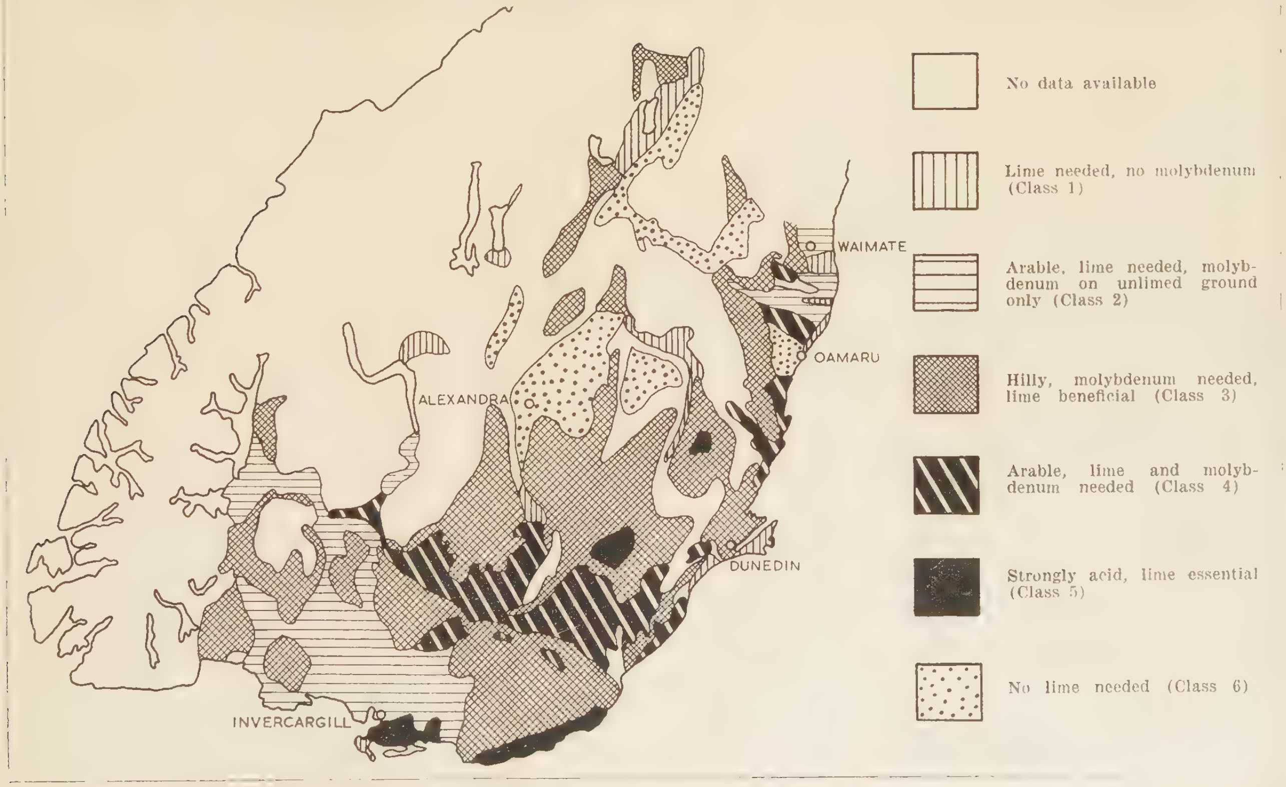
Acid hilly and upland soils deficient in molybdenum

The large areas of these soils (see map below) are hilly or arable but of high elevation. Much of the land is covered by scrub, bush, and gorse, and a large proportion of it is awaiting development.

These soils are deficient in molybdenum and lime. With careful attention to inoculation, clovers can be established without lime except perhaps on the most acid of these soils (the approximate outline of which is indicated on the map). The lattter commonly are very strongly acid (below pH 4.8).

In the great bulk of upland and hilly soils of Southland and coastal Otago the pH of the original topsoil falls between 4.7 and 5.3. Here 5 to 10 cwt of limestone per acre in addition to molybdenum has proved of considerable value in the establishment of oversown clovers and for maintaining their vigour. Its use is advised where and when it is economically justifiable.

Lime and Molybdenum Requirements for Pasture, Otago-Southland


WAIMATE
OAMARU
ALEXANDRA
DUNEDIN
INVERCARGILL
No data available
Lime needed, no molybdenum (Class 1)
Arable, lime needed, molybdenum on unlimed ground only (Class 2)
Hilly, molybdenum needed, lime beneficial (Class 3)
Arable, lime and molybdenum needed (Class 4)
Strongly acid, lime essential (Class 5)
No lime needed (Class 6)

Typical Otago hill country. Here lime and molybdenum are needed for best results.

Some areas of the upland soils of easy contour are also being developed by orthodox methods of cultivation by private interests and by the State. Here molybdenum and 10 to 30 cwt of lime per acre are used.

There is also a small proportion of hill soils on which soil pH 5.1 to 5.7 sometimes allows luxuriant growth of oversown white clover provided molybdenum and, of course, adequate amounts of phosphate and sulphur are supplied.

The potential use of lime on this very large area of acid soils is difficult to assess. The upland soils are commonly of easy contour. Where they lie between 1,300 and 1,800 ft with a well distributed rainfall they may repay the initial use of small quantities of limestone and are often worth gradual impovement beginning with oversowing of clovers followed sometimes by cultivation, cropping, and sowing into good pasture. The Wehenga soil is a good example.

The hilly but lower-lying soils are often farmed in association with improved holdings; they may form an untidy corner of an otherwise model farm. Here with the use of molybdenum and cheaper methods of fencing the introduction of good clover species is not as forbidding a venture as it used to be. In all it is likely that the use of lime will gradually increase unless deteriorating economic conditions strangle plans for improvement.

SOILS OF INLAND OTAGO

The lower lying and arable soils of inland Otago occur where winters are cold and summers hot. Owing to the low annual average rainfall (mainly between 15 and 25 in.), most of these soils are little leached of calcium and are not acid enough to require liming.

Good lime responses on pastures are mainly limited to some of the more acid soils on the fringes of the dry inland basin and to pockets of some of the older and well drained terrace soils. An attempt has been made on the map on page 445 to indicate the approximate position of lime-responsive soils. The soils not responding to lime are also shown.

The identification of lime-responsive areas is complicated by the variability of individual soils. For instance, on one prominent soil type common near Ranfurly there are areas of strong acidity on which pastures respond well to a combination of molybdenum and a light rate of lime and there are areas with an alkaline soil reaction where pastures do not respond to lime and where the use of molybdenum might be dangerous to stock health.

In general free drainage, high elevation, and high rainfall (by inland Otago standards) make for acid soils which might repay liming. Impeded drainage, low rainfall, and lower elevation are often associated with soils near neutrality or even of alkaline reaction. These latter soils do not require liming.

The soils on which the use of some lime may be economic would probably not occupy more than about 150,000 acres. For this the potential maintenance requirement for lime would be about 10,000 to 15,000 tons per annum.

SUMMARY

- Coastal Otago and Southland contain close to 2 million acres of low-altitude arable land on which lime is one of the key factors in the creation and maintenance of high soil fertility. There are further large areas of hilly land and of high-lying, cold, undulating land on which lime is of great benefit provided its use can be made to pay.

- In inland Otago there are perhaps 150,000 acres on which some lime is required for pasture and particularly for lucerne, but the dry climate limits the potential of much of this land and its demand for lime will never greatly influence the total consumption of lime in Otago and Southland.

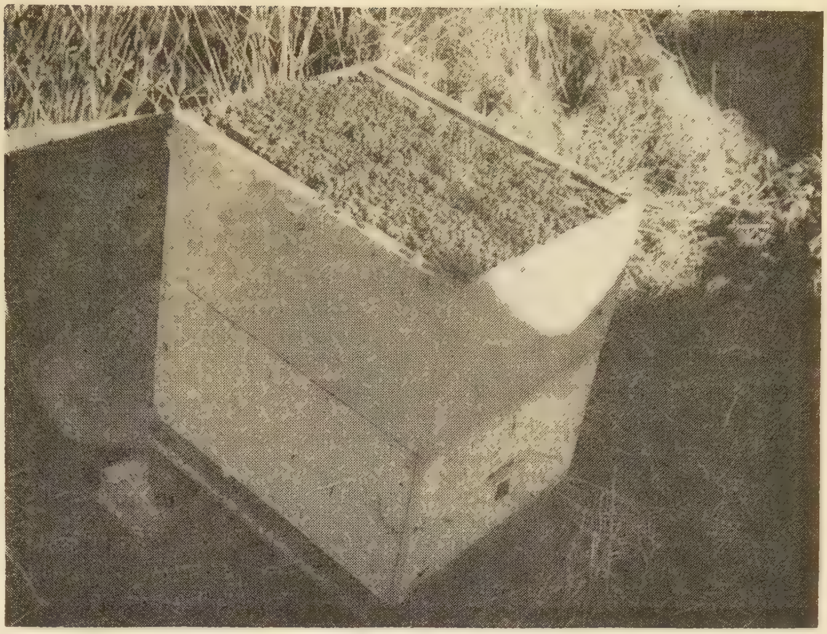
- Though much arable land still remains to be fully developed with the use of 1 to 2 tons of lime and fertilisers, the main demand for lime is expected to come from maintaining the right soil reaction on already improved land. In the areas with a yearly average rainfall of 30 to 45 in. 1 ton of lime every four to six years is required. In inland Otago and on the hilly and high-lying areas smaller maintenance dressings could be used.

- A total demand of about 400,000 tons of ground limestone per annum would appear to be sufficient for maintenance and perhaps land development in Otago and Southland.

Preparation of Hives for the Main Honey Flow

Seasonal Notes for the Domestic Beekeeper

By G. L. JEFFERY,
Apicultural Advisory Officer,
Department of Agriculture,
Gore



The first honey super should be added when the colony has both brood boxes full of bees tending to boil over the tops of the frames.

MOST colonies will require the addition of the third or fourth storey this month to accommodate the rapidly expanding population. A close watch should be kept to prevent swarming and to maintain adequate food reserves. Extracting equipment should be checked, and if new supers are likely to be needed, they should be made up now.

IF the season is early, these supers may be needed at very short notice. A considerable part of the potential crop can be lost by delay in supplying additional supers. In most districts an average of four full-depth supers should be available for each hive. Very strong colonies may require five supers, and the odd hive, because of swarming or some other factor, may need only three.

In a better than usual season, rather than add a fifth or sixth super, fully capped combs of honey can be extracted and replaced. Often bees will refill freshly extracted combs, whereas they would be reluctant to enter and fill an additional super of dry combs.

In some circumstances bees may be very slow at ripening and capping honey, and extra supers should be added then only as the additional storage space is needed. Early in the season the new super can be placed below those full of honey, but toward the end of the honey flow it is best placed on top of the hive. This method will give more full combs for extracting, as it avoids having the same quantity of honey being spread through other combs.

Extracting equipment and honey tanks should now be checked for defects. If rust is showing on extractors or honey tanks, a coat of paint is advisable. A good-quality aluminium paint is usually superior to ordinary paints for the insides of honey tanks and extractors. Surfaces which come in contact with honey should not be painted with lead-based paints.

Colony Strength

Brood rearing should now be approaching its maximum and the third or even fourth storey will now be required to contain all the bees. There should be not less than ten full combs of worker brood, as this brood will be supplying the main working strength of the colony over the honey flow. The colony should still be expanding its brood nest, which will reach its peak toward the end of December.

If the brood nest is kept expanding by combs of young brood being placed in the lower super and hatching brood and empty combs in the second and third supers, most colonies will reach a peak of about 14 full combs of brood by the end of December. If colonies are kept expanding until the main honey flow begins, the morale of the colony will be high. A colony of high morale usually collects a better crop than a similar-sized colony which has passed its peak.

Once the main honey flow begins, brood rearing will be reduced automatically, as cells are filled with honey when the young bees emerge.

Queen Excluders

Queen excluders are used by some beekeepers, but there are problems associated with their use. They are practically essential for production of sections or cut comb, but for extracted honey their advantage is debatable.

Queen excluders tend to cause congestion in the brood nest when honey from spring sources is stored below them. Because the stored honey often restricts the comb area for brood rearing and bees tend not to work freely through excluders, there is a greater tendency toward swarming. Queen excluders also tend to prevent bees from producing the maximum brood, as a queen will often lay more eggs through the centre of three boxes than she would do if she were confined to the two lower supers.

Queen excluders have the advantage of keeping the queen in the lower half of the hive, thus making the removal of honey easier, as there is no need to pack brood down from the upper supers. A queen below an excluder is safe from injury during handling of upper supers for extraction. In autumn the bees will nearly always keep enough winter stores in the lower two supers if an excluder is used, whereas honey has to be packed down for winter stores when an excluder is not used.

DOMESTIC BEEKEEPING . . .

A beginner in beekeeping will generally do better by not using queen excluders until he is more experienced or unless section comb honey is required.

Good combs of worker cells can be obtained when comb foundation is drawn during the main honey flow. Comb foundation is best worked into the second and third supers alternately with drawn combs. If frames of foundation are placed on the hives now, they can be drawn by the bees in readiness for the storage of honey when the main flow begins.

Food Supply

If the weather is unfavourable for the gathering of nectar, stores will be consumed rapidly, and an adequate reserve should always be available. One full comb of sealed honey is about the minimum that should be in a colony, as even this could be insufficient to maintain a strong colony during a week or more of wet weather.

◆

Wool Sales

The dates and venues of wool sales up to the end of June 1962 are:

17 and 20 November: Napier.
24 November: Wellington.
4 December: Christchurch.
9 December: Invercargill.
14 December: Dunedin.
18 December: Timaru.
10 January: Wanganui.
15 and 17 January: Auckland.
22 and 24 January: Napier.
29 and 31 January: Wellington.
14 and 16 February: Christchurch.
21 and 23 February: Invercargill.
28 February and 2 March: Dunedin.
6 March: Timaru.
16 March: Wanganui.
21 and 23 March: Auckland.
28 and 30 March: Napier.
4 and 6 April: Wellington.
13 and 16 April: Christchurch.
30 April and 2 May: Invercargill.
16 and 18 May: Auckland.
23 and 25 May: Napier.
29 May: Wanganui.
2 June: Wellington.
15 June: Auckland.

◆

Ram Fairs

The following are dates and venues of ram fairs up to the end of March:

11 December—Central Hawke's Bay at Waipukurau.
14 December—First Feilding at Feilding.
14 and 15 December—Hawke's Bay at Hastings.
15 January—Wairoa County at Wairoa.
23 January—Second Feilding at Feilding.
25 January—Southland Stud Southdown at Invercargill.
9 February—Dannevirke at Dannevirke.
24 February—Southland Flock (all breeds except Romneys) at Invercargill.
27 February—South Otago at Balclutha.
7 March—Southland Flock (all breeds except Southdowns) at Invercargill.

◆

Meteorological Records for September

Station	Height of station above M.S.L. (ft)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	240	54.4	+0.6	67.5	36.8	5.10	14	—0.4	0.94	27	145
Auckland	160	55.0	+0.5	66.0	39.7	4.76	14	+1.0	2.44	9	168
Tauranga	12	53.2	+0.6	66.2	34.8	5.69	14	+1.9	3.26	9	155
Ruakura	131	52.4	+1.5	66.8	30.2	3.90	17	+0.2	1.39	9	156
Whakarewarewa	1,006	50.5	+1.5	65.0	30.8	5.50	15	+1.0	2.02	9	150
Gisborne	14	52.6	+0.5	71.0	32.6	4.84	14	+1.9	1.78	28	167
New Plymouth	160	52.4	+0.7	64.9	37.4	3.69	10	—1.1	1.49	17	159
Kariol	2,125	45.0	+0.0	64.5	25.9	4.34	13	+0.4	0.70	22	—
Napier	5	52.6	+0.6	70.0	32.8	4.34	11	+2.4	1.05	27	164
Wanganui	72	51.2	—0.9	69.6	34.9	3.42	15	+0.9	1.16	17	143
Palmerston North	110	50.6	+0.1	68.2	34.7	5.53	18	+2.6	1.61	17	123
Waingawa	340	48.8	—0.5	68.3	30.5	7.00	15	+3.9	1.50	17	129
Wellington	415	49.2	—0.7	64.9	36.3	6.66	17	+2.9	1.45	10	152
Nelson airfield	5	49.2	+1.0	62.2	33.0	4.13	12	+1.2	1.60	9	185
Blenheim	14	49.7	—0.5	69.1	29.5	2.67	10	+0.3	1.15	17	190
Hanmer Forest	1,270	43.2	—2.9	65.0	25.2	7.32	16	+3.3	1.38	10	139
Hokitika South	15	48.4	+0.6	64.6	30.0	6.85	16	—1.5	1.12	26	150
Christchurch	22	47.6	—1.1	68.8	32.2	2.64	12	+0.6	1.06	9	120
Ashburton	323	46.8	—1.1	73.5	29.8	2.24	9	—0.2	0.75	8	106
Timaru	56	47.8	—0.1	69.1	32.2	1.46	12	—0.3	0.86	9	131
Alexandra	520	45.1	—2.0	67.7	25.2	0.90	9	+0.1	0.27	21	148
Taieri	80	46.1	—1.6	70.6	28.0	2.61	12	+0.6	0.95	23	111
Invercargill airfield	0	45.2	—0.5	64.9	26.8	2.93	18	—0.4	0.59	22	114
Chatham Island	150	47.4	—0.8	57.0	33.7	3.20	15	+0.8	0.96	10	119

Dairy Produce Graded for Export during August

THE following figures showing quantities of dairy produce graded for export during August 1961 and for the same month of 1960 have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage Increase
August 1961	12,651	153	12,804	—
August 1960	12,300	171	12,471	—
Increase	+351	—18	+333	+2.670

Butter in store at 31 August 1961 was 10,624 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage decrease
August 1961	1,856	420	2,276	—
August 1960	2,870	154	3,024	—
Decrease	—1,014	+266	—748	—24.735

Cheese in store at 31 August 1961 was 4,152 tons

If these figures are converted into butterfat equivalent, there is a decrease of 0.03 per cent in butterfat graded for August compared with the same month of last season. The above figures refer only to butter and cheese graded for export and do not include butter and cheese used on the local market and other products such as anhydrous milk fat, whole milk powder, and other whole milk products, and are not necessarily a true indication of production trends.

☆

Lungworm Disease in Calves

By G. A. DURHAM,
Veterinarian,
Department of Agriculture,
Papakura

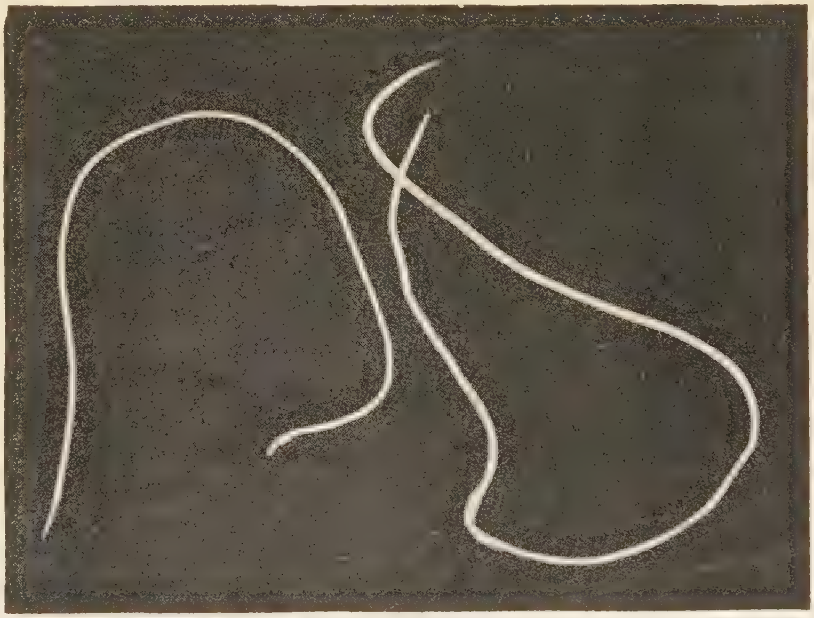
LUNGWORM disease is widespread throughout New Zealand and causes considerable economic loss. For the condition to be controlled the farmer must have at least an elementary knowledge of what causes it, how animals become infested, and what can be done about the disease by improved animal husbandry and medicinal treatment.

LUNGWORM disease is the name that is probably the most widely used in New Zealand. "Husk" is another name for the same disease, and is probably a borrowed term, being used extensively by farmers in the United Kingdom.

In technical articles the more scientific terms "verminous pneumonia" and "pulmonary helminthiasis" are commonly used.

The disease is caused by a roundworm parasite called *Dictyocaulus viviparus.*

Above: Calf suffering from severe worm infestations. **Below:** Lungworm (*Dictyocaulus viviparus*), twice natural size.



Symptoms

Though cattle of all ages can be infested, the disease is most common in calves.

Affected calves cough, their breathing is laboured, and there will be anaemia and loss of condition. Some calves become emaciated and die. Apart from the coughing the clinical symptoms are somewhat similar to those of infestations with stomach and intestinal worms.

It is quite common to have infestations with worms in both the respiratory and digestive tracts at the same time.

Groups of animals rather than single animals are usually affected, and deaths may be sudden.

Method of Infestation

A calf picks up lungworm larvae (an immature stage in the life history of the worm) from infested pastures. These larvae go down the digestive tract into the calf's intestines, where they penetrate the walls and migrate via the bloodstream to the air passages of the lungs, where they develop into adult worms and cause considerable damage to the lung tissues. Associated with this lung damage secondary infections by bacteria or germs are frequent.

Adult lungworms are coughed up in the expectorate from the respiratory air passages and lungs and expelled on to the pastures, where the worms continue their life cycles.

Age of Susceptibility

Calves at or after weaning are most commonly affected, though older stock may contract the disease.

LUNGWORM IN CALVES . . .

As calves get older they appear to develop an increasing natural resistance or immunity to infestation.

Calves that have recovered from an attack also have high immunity.

Post-mortem Signs

Apart from the signs of anaemia and emaciation it is usually not difficult to find the lungworms if the windpipe is slit with a knife and followed along its various branches right into the substance of the lungs.

Adult lungworms are quite easy to see with the naked eye. They are creamy white, circular in cross section, and pointed at each end. The worms tend to coil up and get entangled with each other.

Occasionally calves die from lungworm infestation while the worms are only in the early larval stages in the lungs and no adult worms are visible. In such cases a laboratory examination of the lungs may be necessary to confirm lungworm infestation.

Laboratory examination of dung is not a reliable guide to infestation with lungworms.

Affected calves should be taken off infested pastures and put on to clean land. The plane of nutrition of the calves should be raised by providing hay, silage, or other supplementary feeds.

Infested paddocks should be rested, as time and sunshine will eventually kill the larvae. Alternatively infested paddocks can be grazed by non-susceptible animals such as sheep or horses.

Avoid long, damp pastures for calves. The larvae thrive under damp conditions, particularly if they are not exposed to much sunshine.

Lungworms are frequently associated with stomach and intestinal worms, so calves should be treated with phenothiazine or other suitable worm drench at the same time. If the stomach and intestinal worms are disposed of, the calf has a better chance of fighting the lungworms.

Rotational grazing of calves as practised at the Department of Agriculture's Animal Research Station, Ruakura, is strongly recommended as a preventive against lungworms as well as stomach and intestinal worms. Heavy strip-grazing of long, lush pastures by adult cattle will help to get rid of larvae by exposing them to sunlight.

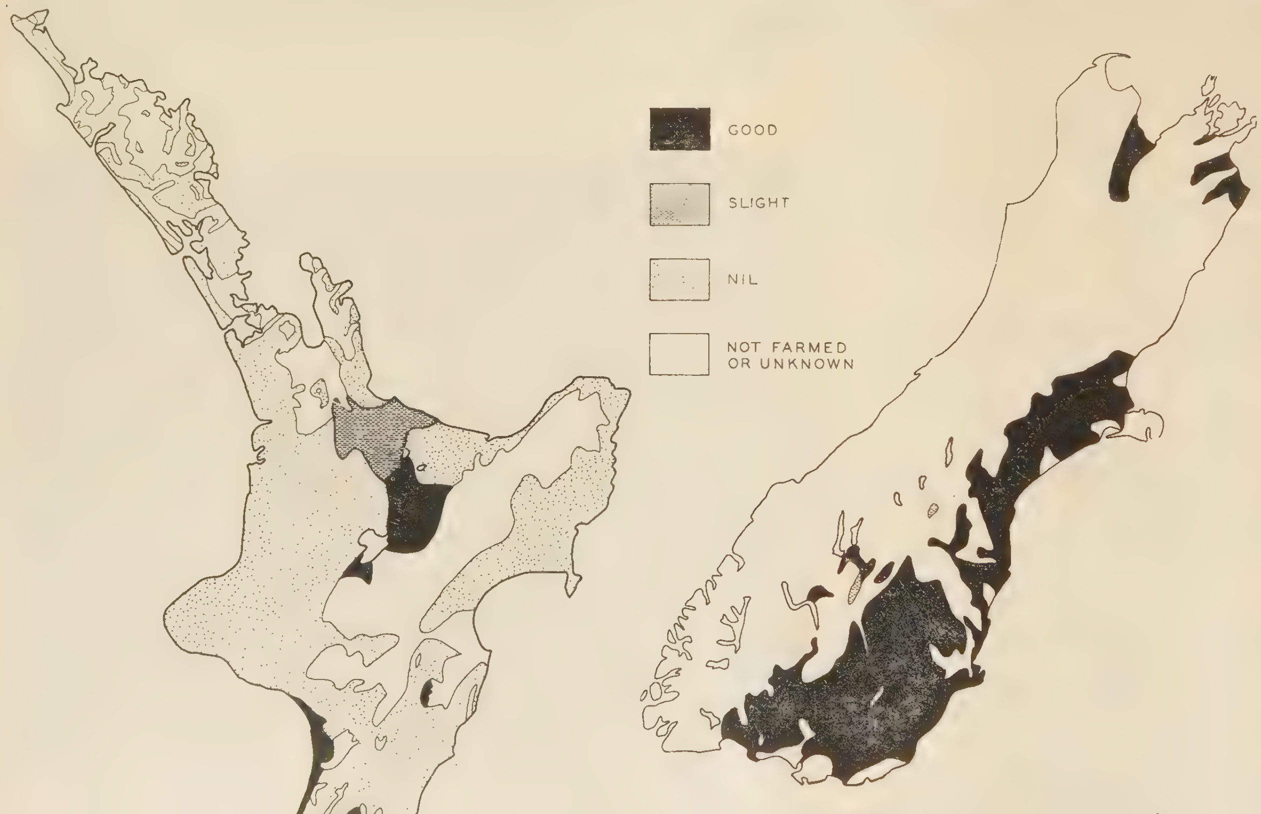
Attention to husbandry and dosing with phenothiazine may be all that is necessary.

Where the expense is warranted drugs are available which can be administered by mouth and by subcutaneous injection, depending on the circumstances.

Consult your veterinarian regarding the supply and use of these preparations.

In the United Kingdom a vaccine has been developed for use against lungworms, but it is too early to evaluate it under New Zealand conditions and it is not yet available commercially here.

Live Weight Responses to Selenium in Lambs



In the reproduction of the maps showing live weight responses to selenium in lambs, on page 307 of the October issue of the "Journal", a good deal of the contrast in some of the patterns used was lost. As this may have made the maps difficult to follow, they are republished above with a different legend to give clarity.

VEGETABLE PRODUCTION

[*Sparrow*

▲ Hand pulling a commercial carrot crop for bunching.

Carrots and Parsnips*

CARROTS (*Daucus carota*) and parsnips (*Pastinaca sativa*) are grown successfully under a wide range of soil and climatic conditions. In most commercial vegetable growing districts in New Zealand they are harvested the year round, though in home gardens their use tends to be more seasonal. From the public health viewpoint carrots are a very important crop. Because of their vitamin content they are valuable in the diet from an early age onward and there is a steady demand for them all the year round. A small proportion of the crop is used for processing. They are deep frozen and canned, usually in combination with other vegetables, or dehydrated and used for packeted soups. Public demand for parsnips is much smaller and fluctuates with the seasons, but the restaurant trade takes a steady supply throughout the year.

DEPENDING on the shape of the root, which is a varietal characteristic, carrots and parsnips need varying root depths. Stump-rooted varieties penetrate only a few inches, while large, long-rooted varieties need a growing depth of well over a foot. Within this required depth the soil must be in really good physical condition if roots are to be of satisfactory shape.

Forked and irregularly shaped roots occur if the plants have difficulty in penetrating the soil to their full required depth. Forking and related troubles of carrots and parsnips occur most frequently if they are grown in tight and lumpy clay soils, if the soil contains grit or gravel, if roots come in contact with undecayed organic debris, or if they strike concentrations of the applied fertilisers because these have not been worked evenly through the soil. To avoid most of these difficulties, carrots and parsnips are generally grown commercially in the lighter alluvial soils, sands, and peat soils, but in the Auckland Province they can be grown successfully on the volcanic soils because of their excellent structure.

On the sandy loams and coastal sands, if they are low in organic matter and therefore of poor water-holding capacity, violent changes in soil moisture can occur in certain weather. If a period of rain follows a relatively dry period, carrots may split in the ground and this can cause heavy crop losses. Parsnips are less susceptible to this trouble. This condition will be aggravated if the plants are growing in soil well supplied with nitrogen and have produced luxurious top growth. To avoid this condition as much as possible, the lighter soils should be well supplied with organic matter.

Germinating carrots are weak and fragile and cannot penetrate a surface crust formed as rain or irrigation water falls on a bare soil. If a soil type is liable to form a crust, there is some risk in using it for carrots.

---

* Compiled from information supplied by field officers of the Horticulture Division by W. BRANDENBURG, Instructor in Horticulture, Department of Agriculture, Christchurch.

MILKING SHED

You're just a BUZZ-Z-Z away

with this

NEW intercommunication *MARVEL*

At last, the portable transistor telephone reaches New Zealand — just the thing for the farmer AND his wife.

Save yourself time and worry with this instant intercommunication lightweight phone. The entire mechanism (including battery!) is in the handset. It couldn't be easier to use with only a connecting wire needed between the two phones. No installation costs, minimum maintenance, and ready for use the moment you get it home!

[illegible]
Ask for the simple demonstration
at your branch of

Dalgety
AND COMPANY LIMITED
[illegible]

Powerful · Rugged · Dependable

THE **AGROTILLER**
ROTARY CULTIVATOR

MOUNTED AND
TRAILING MODELS . .

60" or 70" Trailing models
available

40, 50, 60
mounted models available

Perfection in Cultivation

Approved by the leading tractor manufacturers

[illegible] N.Z. Distributors

Ivory Bros. Ltd.

P.O. BOX 200, PETONE. P.O. BOX 1321, AUCKLAND

Crusting can be reduced by working organic matter into the soil, by correct cultivation methods, by maintaining surface moisture, and by choosing the right weather for sowing.

Commercial gardeners generally sow carrots and parsnips on land that has been well prepared and manured for a previous crop such as cabbage, cauliflower, lettuce, or—in the north—onions. Much of the soil preparation for carrots and parsnips centres on this previous crop. If possible, a green manure crop should have been grown before this crop was planted or a heavy application of organic matter made. To offset the temporary nitrogen deficiency caused by the bacterial breakdown of the organic matter in the soil, generous quantities of soluble nitrogen such as sulphate of ammonia or a nitrate fertiliser should have been applied. If lime is required, this should also have been applied before the previous crop. Carrots and parsnips will tolerate reasonably acid conditions.

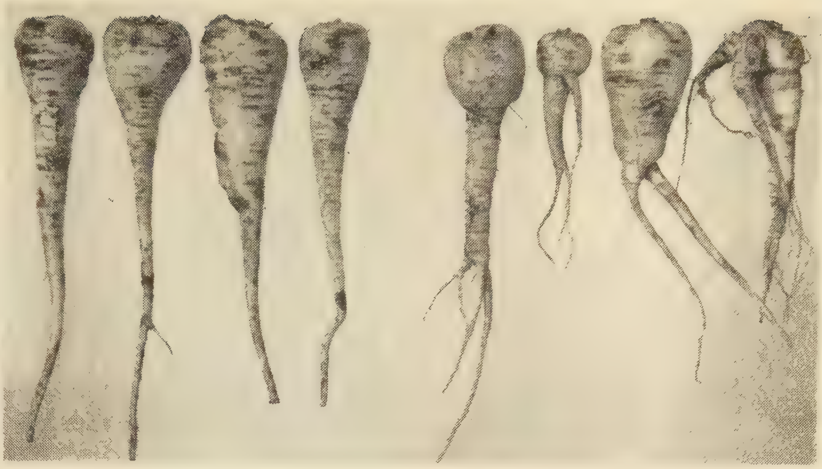
When preparation of the land for the carrot and parsnip crops starts, the stumps and debris of the previous crop can be chopped up by a shallow rotary hoeing and after a short period of decay this litter must be ploughed down as deeply as possible to put it out of reach of the growing carrot roots.

With the exception of peat soils, all soils can be easily compacted too much for carrots, especially by tractor wheels, and cultivation should be kept to a minimum once ploughing has been done. Two strokes with tine harrows or shallow-set tandem discs will usually break up and resettle the plough furrows sufficiently and final seedbed preparation can be done with chain harrows. Ganging of implements behind the tractor can be useful in reducing the number of passes to be made over the paddock.

Rolling should not be required on soils suitable for carrots and parsnips. Discing instead of ploughing can be done where only short-rooted varieties are grown, but is not favoured.

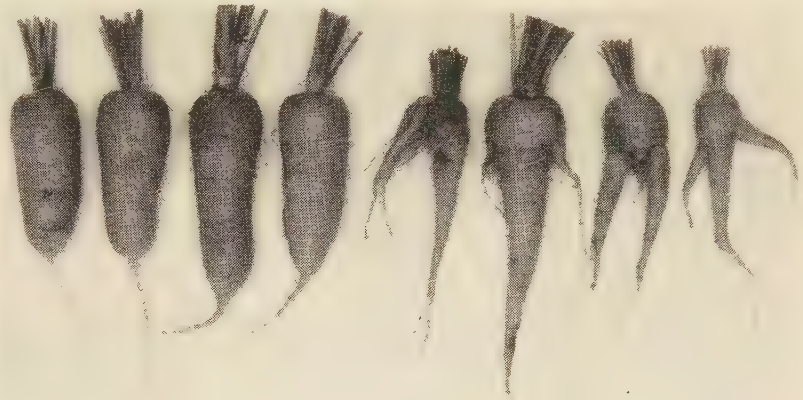
In northern districts raised beds are often used to improve drainage and soil temperatures in winter. As these are thrown up by tractor-drawn moulders after the main cultivations have been done, compaction is largely avoided.

Fertiliser requirements of carrots are quite low in well prepared soils; parsnips can stand a little more. Proprietary mixtures are used in some areas, but most growers make up their own mixtures. In general the mixtures used have a high content of phosphate and (if used at all) potash and a low content of nitrogen. An average, basic ratio for nitrogen, phosphorous, and potash would be 1 : 2 : 2. In Auckland Province potash is usually included, but it is seldom used elsewhere. Only in Canterbury is there an awakening interest in the use of potash for carrots.



[Sparrow

Forked and misshapen roots occur if parsnips (above) and carrots (below) have difficulty in penetrating the soil to their full required depth. Normal roots are on the left in each case.



[Sparrow

Where the main growth period of the crops is in summer and autumn, fertiliser mixtures are usually based on blood and bone with extra superphosphate added to increase the soluble phosphate content and with sulphate or muriate of potash added in some districts. Rates of application of this mixture vary from 4 to 10 cwt per acre for carrots to 10 to 15 cwt for parsnips, depending on previous manurial treatment of the soil.

For spring growth, when bacterial activity in the soil is slow, more soluble forms of nitrogen, such as sulphate of ammonia or nitrates, are needed. In that case rates of application are reduced to 2 to 5 cwt per acre. In some districts side dressings of nitrates are applied to the growing crops. For general home garden use a mixture of blood and bone (5 parts by weight), superphosphate (3 parts), and sulphate of potash (1 part), applied at 2 to 4 oz per square yard, should be satisfactory.

Seeding

There are three main methods of sowing carrots commercially and two of them apply to parsnips also.

1. On the Flat

Here sowing is generally done by a battery of mechanical seeders on the tool bar of a tractor. Seed is generally sown in single rows; distance is determined by the dimensions of the equipment used and the size of the crop to be grown. It ranges from 10 to 12 in. between rows for early bunching carrots to 15 in. rows for main-crop carrots. Large varieties in the South Island are grown up to 30 in. apart.

Parsnips are sown in the North Island in rows ranging from 12 in. for spring crops to 15 in. for main crops, and in the South Island main crops are sown on a spacing as wide as 30 in. Generally no thinning is done.

2. On Ridges Thrown up by Tractor-drawn Moulders

Locally designed or adapted equipment flattens the ridges, sows the seed

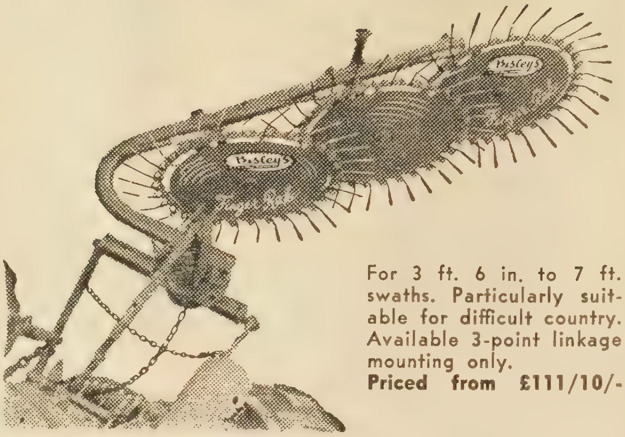
Bisley's
BETTER *Farm* MACHINERY

FINGERWHEEL RAKES

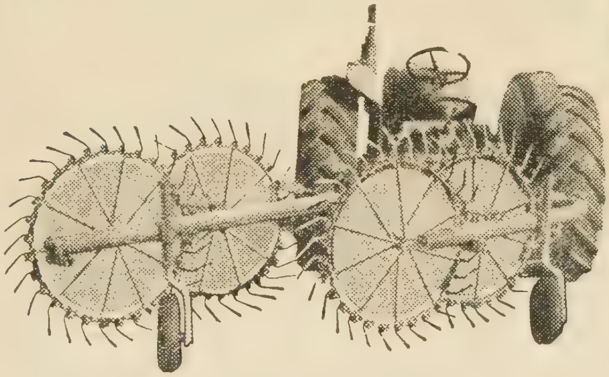
A CHOICE OF FIVE DIFFERENT SIDERAKES

THREE-POINT LINKAGE AND TOWED MODELS

Model 4S and 5S handles up to two 6 ft swaths. The fifth reel can be fitted for extra width in light crops.
Priced from £156



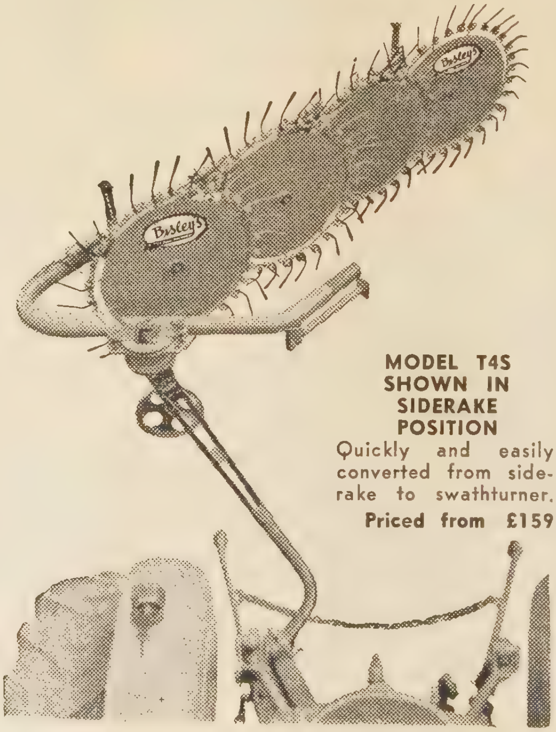
For 3 ft. 6 in. to 7 ft. swaths. Particularly suitable for difficult country. Available 3-point linkage mounting only.
Priced from £111/10/-



Buy the rake that has revolutionised harvesting methods in N.Z. and Australia.

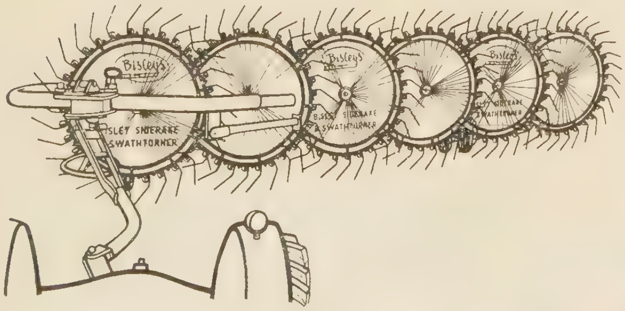
A RAKE FOR EVERY JOB

- SIDERAKING
- SWATH TURNING
- WINDROWING



MODEL T4S SHOWN IN SIDERAKE POSITION

Quickly and easily converted from siderake to swathturner.
Priced from £159


Bisley's
BISLEY SIDERAKE SWATHTURNER
Bisley's
BISLEY SIDERAKE SWATHTURNER
BISLEY SIDERAKE SWATHTURNER

Model 6ST 6-reel rake will siderake a clear 12 ft. swath even in light grass or lucerne. Available only as a trailer model.
Priced from £189/15/-

A. M. BISLEY & Co. Ltd.

Ward St., HAMILTON - Antigua St., CHRISTCHURCH

Branches at Te Awamutu, Morrinsville, Te Puke, Whakatane, Rotorua, and Timaru.

DISTRIBUTORS IN ALL MAIN TOWNS.

in a band or double row, and covers it. Ridges are generally 30 in. apart. They are used for overwintering crops of both parsnips and carrots. Parsnips are often hand thinned to about 3 in. spacing.

3. On Raised Beds

These are used for overwintering and early crops of carrots for bunching. They are thrown up by moulders and flattened by some form of improvised scraper. Seed is sown by a battery of seeders on a tool bar in beds of three or four rows 10 to 14 in. apart, with 18 in. between beds. Some hand thinning is done.

Sowing Rates and Depth

Carrot seed must be sown very shallow. Even on the lightest soils ½ in. should be the maximum depth, as otherwise germination may be poor. Sowing rates depend on sowing method and variety and range from 1½ lb per acre for coarse varieties grown in single rows to 4 lb per acre for early bunching varieties grown in beds.

Parsnips can safely be sown much deeper and where dry conditions occur can be sown 1 in. deep or slightly deeper. Sowing rates again depend on the type of crop and range from 6 to 7 lb per acre for early spring crops in the north to only 1½ lb for main crops in the south.

Inter-row Cultivation and Weed Control

As carrots are frail shortly after germination and make only slow growth initially, they are easily overcome by competition from weeds. Parsnips are better able to outgrow weeds, but their successful establishment also depends on good weed control in the early stages. The soil should be disturbed as little as possible in the process, as young carrots are easily buried and in North Island districts soil disturbance among these crops can attract an attack by carrot rust fly.

In commercial gardening weeds **between** the rows are controlled by careful inter-row cultivation with tool bar mounted hoes, steerage hoes, or wheeled hoes pushed by hand.

To control the weeds in the rows power kerosene or proprietary weedkillers based on light petroleum oils are used. Power kerosene varies a little in quality and has been known to cause damage to crops. A few yards should, therefore, always be sprayed experimentally when a new drum is taken into use. Proprietary materials are safe if applied correctly.

Application rates vary with density of sowing and range between 25 and 60 gallons per acre. Materials are applied with knapsack sprayers or tractor-mounted boom sprayers equipped with fan nozzles centred above the rows.

[*National Publicity*

Gathering and bagging main crop carrots in Canterbury. This crop was dug with a potato digger after the tops had been removed with a mower.

Petroleum oils are very efficient for killing young weed seedlings, but have little effect on perennial weeds. Very often the first application is made just before the crops emerge to kill weeds germinating ahead of the crops. Two or three applications are often made after emergence of carrots; parsnips need fewer, as they are soon able to smother out weeds themselves.

Used with care the first application after emergence can be applied while the crops are still in the cotyledon stage. Applications must be finished before the crops are 6 in. high; otherwise scorching occurs and on early bunching carrots late application may taint the crop.

The chemical weedkiller CIPC has been used in several districts. It is sprayed immediately after the seed is sown and before seedlings emerge.

In Auckland Province it is used in the colder parts of the season only and at 2 lb of carbamate equivalent per acre. In Canterbury and North Otago it has been used as late as early summer at 4 lb of carbamate equivalent per acre with only slight, temporary damage to the carrots and no visible effect on parsnips.

Effective rates generally lie between these extremes and application is safest under cool conditions. It gives good control of germinating weeds. In Canterbury the weed fumitory (*Fumaria muralis*) has proved resistant to CIPC and is becoming the dominant weed in sprayed crops, producing dense infestations. A few other weeds are partially resistant.

Propazine, a triazine compound, has been used experimentally and appears promising where flat weeds are dominant. It does not seem to give control of grasses.

Features of Main Varieties of Carrots

Topweight: A high-producing variety first developed in Australia. Long, smooth roots, tapering evenly to a stump end. Slightly rounded shoulder growing a little out of the ground. Grows large if left to mature. Deep colour and high quality if pulled before large size is reached. Very resistant to bolting. Tolerant to aphid attack.

Manchester Table: Originally a selection of the French variety Nantes. This variety has been popular for a long time. Medium size roots, smooth surface, and deep colour. Roots almost cylindrical, little taper, stump and shoulder slightly rounded. Generally remains underground. Medium-vigour tops.

Touchon: A reselection from Manchester Table, having still deeper colour and more even shape.

Early Nantes: An early selection of the original variety. Quick maturing smallish tops, suitable for early bunching. Roots almost cylindrical, nearly coreless and deep orange.

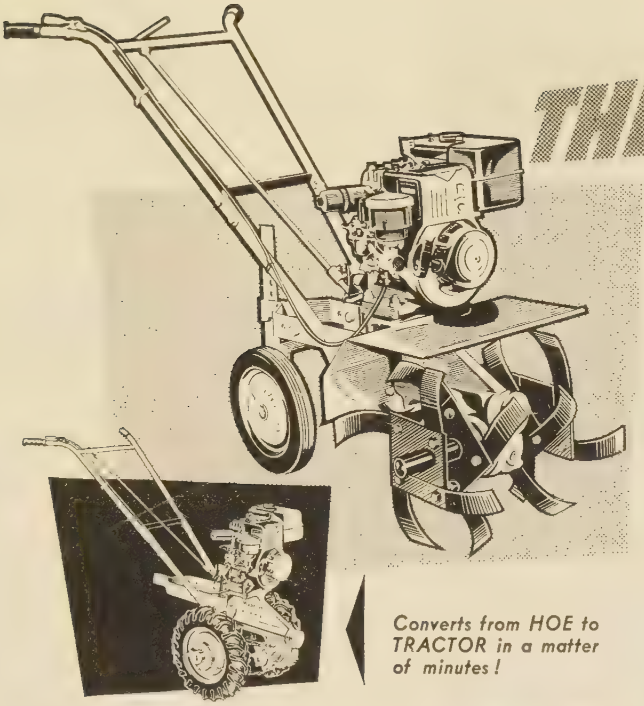
Morse's Bunching: Probably another selection from the original Nantes variety. Matures later than Manchester Table or Touchon. Roots pointed until full growth is reached. Slow bolting. Of the same colour and texture as Manchester Table.

Chantenay: The original variety has a fairly short, broad shouldered root fairly strongly tapering to a stump. Good deep orange, but distinct core. Mainly for spring and summer sowing; it will bolt if sown too early. It has now largely been superseded by new selections, such as:

Red-cored Chantenay: Fairly short, broad-shouldered root tapering to a blunt end. Very deep orange; core darker than outside flesh.

Chantenay Long: A longer, narrower selection; smaller overall size of roots; better shape for bunching. Other characteristics similar to parent variety.

Sutton's Favourite: Probably also related to the original Chantenay



THIS 1 MACHINE

WILL SAVE HOURS OF HARD WORK

does a dozen jobs quickly, efficiently and cheaply!

The MASPORT ROTA-HOE is the most useful workmate ever designed for the farmer, the orchardist, the nurseryman and the domestic gardener. Soundly engineered, of exceptionally robust construction and driven by a Briggs and Stratton 4-stroke engine, this mighty powerful machine is a real tiger for work.
For breaking in new ground, digging, cultivation, weeding and ridging, the MASPORT ROTA-HOE is a really worthwhile investment! In a matter of minutes it can be converted into a phenomenally powerful tractor capable of towing heavy loads or drawing cultivating implements.

FIND OUT MORE ABOUT THIS WONDERFUL MACHINE

Fill in and post coupon today for FREE information leaflet.

Converts from HOE to TRACTOR in a matter of minutes!

Single Speed Model	£64/10/-
Two Speeds Model	£69/10/-
Conversion Kitset (ratchet wheels with tyres)	£28/1/-

F. W. CAVE LTD.

P.O. BOX 1685, Auckland.

Please send me FREE illustrated folder giving full details of the MASPORT ROTA-HOE or ROTA HOE TRACTOR and the name of the nearest dealer.

NAME ……………………

ADDRESS ……………………

…………………… JA4.

Masport ROTA-HOE

Waratah

FENCING MATERIALS

Black Varnished Steel Fence Posts made in New Zealand and Fencing Wire made by Rylands Bros. (Australia) Pty., Ltd.

Made from B.H.P. Steel— The Best you can buy.

WARATAH POSTS

available in two lengths.

6 ft. — Slot in top for barb
Hole spacings :
1″, 8″, 7½″, 6″, 5″, 4½″, 4″, 4″.

5 ft. 6 in. — Slot in top for barb
Hole spacings :
1″, 8″, 7″, 6″, 5″, 5″, 5″.

Enquire from your usual supplier

WARATAH

FENCING WIRE

(including 12½ gauge High Tensile)
Fully galvanised to ensure longer life and to resist the corrosive action of salt-laden air. Guaranteed to comply with New Zealand Standard Specification 143 Type A.

variety. Very broad shouldered, stump root. Very uniform, good texture and colour.

Scarlet Horn: A selection from Redcored Chantenay. Deep colour with very dark interior. Very uniform.

Spring Market: Similar to Chantenay; long. Deep orange throughout when young. Slower to bolt and can be sown earlier.

Egmont Gold: A selection from Holmes Improved which yields heavily and produces large roots. Texture and flavour good, but appearance good only when roots are still young. Golden yellow flesh with distinct light-coloured core. Large, broad shouldered, tapering, fairly sharp pointed root, shoulders growing out of the ground. Has strong growing, aphid-tolerant tops. In the north it is used as an early bunching carrot, as it reaches a usable size quickly.

Taranaki Strongtop: Another selection from Holmes Improved. Heavy producing variety growing large roots if left to mature. Good texture and flavour, indifferent appearance. Grown as an early bunching carrot occasionally in the north.

Features of Main Varieties of Parsnips

Hollow Crown: The main market variety. The good strains have narrow shoulders, even taper with smooth surface, are almost white, and are free from side roots. Can be stored in the ground for a long period without deterioration.

Student: As above, but rather longer roots.

Harvesting and Packing

New season (early spring) carrots are nearly everywhere lifted by hand, bunched, washed, and packed in a wide variety of boxes and crates. Occasionally parsnips are treated in the same way.

Main-crop carrots and parsnips are sometimes also pulled by hand, but wherever soil conditions permit they are ploughed out or lifted with a potato digger. For these methods the soil has to be light and friable enough to fall off the roots easily and leave them fairly free of soil after ploughing or lifting.

In most districts where carrots and parsnips are lifted with potato diggers the shaker chains are removed and the carrots and parsnips are lifted with the tops still on. Canterbury growers sometimes go one step further and remove the tops first with a rotary mower before they use the potato digger with the chains left in operation.

Where hand pulling cannot be avoided for main-crop carrots and parsnips it is made easier by drawing a wrenching tool underneath the roots by tractor, thus eliminating the use of forks.

Washing is being done increasingly in most districts, revolving-drum types of washers being most frequently used. A very efficient washer having high pressure water jets and revolving brushes is in use near Christchurch.

After washing, carrots and parsnips are usually marketed in open-mesh bags. If the roots are not washed, they are generally put in sugar bags or fruit boxes and packing is then usually done in the field.

PESTS AND DISEASES

Carrot Rust Fly

Carrot rust fly (*Psila rosea*) is a major pest of carrots and parsnips in commercial growing areas throughout the North Island as far south as Palmerston North. It is also causing serious trouble to home gardeners. Damage is caused to the roots by the tiny, white maggots of the small (about 1/6 in. long) shiny black fly.

Eggs are laid near the roots of carrot plants during several distinct flight periods. On young carrot and parsnip seedlings the taproots are entirely destroyed and the plants die. In older roots the burrows of the maggots, filled with rusty brown excreta, can be easily seen in the outer layers. The carrot rust fly also attacks celery and parsley and weeds such as wild carrots and hemlock. It is probably carried over from crop to crop by these alternative hosts.

As carrot rust fly attacks are worst in sheltered places, near hedges, etc., crops should be grown as much as possible in the open. Thinning and hoeing, by disturbing the soil and bruising roots or foliage, release an odour of this crop that attracts the egg-laying flies. Thinning should be done when the carrots are very small, and the crop should be watered immediately afterward to settle the soil.

Horticultural naphthalene broadcast in the crop or creosote-treated string run above the seedbeds are good repellants of the fly that may be used by home gardeners.

Treatment with insecticides has come into general use commercially. Two distinct methods are:

1. Application of a soil insecticide such as aldrin or an insecticide with very long residual effect such as dieldrin to the soil by mixing the materials with the base fertilisers at rates of 2 to 4 lb of active material per acre.

2. Seed treatment by coating the seeds with lindane 50 per cent wettable powder at 2 per cent of seed weight, followed by monthly spraying of the crops with lindane 50 per cent wettable powder at 1 lb per 100 gallons of water until a month before harvest.

Aphids

Aphids (*Cavariella aegopodii* and others) are the main pests of carrots in the South Island, but are also of considerable consequence in most North Island districts and on parsnips. Aphids may attack at any time of the year, but are worst on carrots in the South Island in early spring. Infestations are established by winged female aphids landing in young carrot crops after having migrated from an older crop or from weeds.

Female aphids do not lay eggs at that stage, but produce live young directly, and numbers increase very rapidly. Damage results from sucking of the sap of the leaves, and a heavy infestation can cause all but the most vigorous plants to wilt and die. Aphids also carry virus infection.

Control

$\boxed{1}$ Carrot varieties with vigorous tops that are able to carry a heavy aphid infestation without suffering much damage have been bred. (The discovery that a carrot variety Holmes Improved, originally bred for stock feed in Taranaki and having strong aphid-tolerant top growth, yielded carrots of good texture and culinary flavour led to this approach. Several varieties with still further improved flavour and texture have been selected from the original strain and are now very popular, especially among home gardeners.) Parsnips normally will withstand quite heavy aphid infestation, with little crop loss.

$\boxed{2}$ In the South Island main-crop carrots are sown in November or December, when the heaviest migrations of aphids are over.

$\boxed{3}$ Crops can be sprayed with insecticides, lindane (which will also control carrot rust fly) and malathion commonly being used.

In Canterbury TEPP has been used on early spring carrots for bunching. Metasystox, used in trials by the Plant Diseases Division, Department of Scientific and Industrial Research, Lincoln, has also given good control of aphids.

Springtails

Springtails or collembola are reported to be troublesome occasionally on carrots in the North Island. These minute wingless insects, which have jumping apparatus on the underside of their bodies, may occur in enormous numbers when decaying organic matter is present. Usually they feed harmlessly on dead plant residue, but occasionally they attack germinating seedlings and may completely destroy a germinating crop overnight. This presumably happens when they are present in large numbers and the supply of organic matter runs out.

for easy, effective, economical, year round

WEED & BRUSH CONTROL

use new Du Pont

*DYBAR

FENURON PELLETS

Kill brush along fences, ditchbanks, hill country, farm and waste areas. N.Z. wide trials show DYBAR is successful in controlling the following weeds — Sweet Briar, Blackberry, Barberry, Gorse, Boxthorn, Hawthorn, Broom. DYBAR should not be used when ground is frozen or snow covered.

DISTRIBUTED BY:—

J. H. BARBOUR & SON LTD.
Wellington, Auckland, Christchurch
FRANK M. WINSTONE (Merchants) LTD.
Auckland, Palmerston North, Dunedin
NEILL, CROPPER & CO. LTD.
Auckland, Wellington, Christchurch, Dunedin

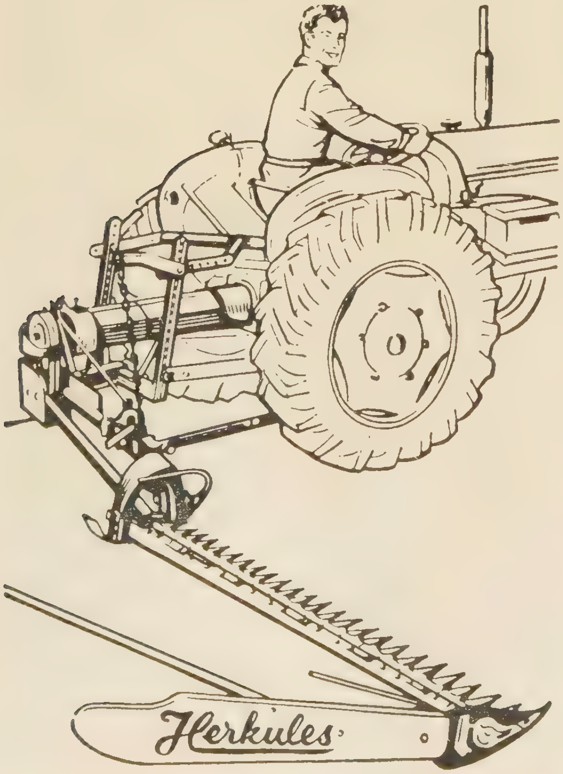
DU PONT

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

* Registered Trade Mark:—E. I. Du Pont De Nemours & Co. (Inc.) Industrial and Biochemicals Department, Wilmington, Delaware.

Other Du Pont Weed Killers recommended:—"TELVAR" MONURON and "KARMEX" DIURON for crops and sterilization application; "AMMATE" X for weed and brush killing; "TRYSBEN" 200 for perennial noxious weed killing.

DF.1



To do a better job . . . faster . . .

THE

HERKULES Mower

Only HERKULES gives you these big advantages

1 Adjustable frame fits all tractors with 3 point linkage.
2 Positive Breakaway release when obstruction hit.
3 Forged steel fingers and tempered sections.
4 Most popular mower in NZ—thousands in use today.
5 Unbelievable low price: 5 ft. cut £105; 6 ft. cut £107-10-0.

HERKULES

—the Swedish Precision Mower

Write for name of nearest stockist.

Farm Equipment Co. Ltd.

WANGANUI

Springtails can be controlled by spraying with dieldrin at the strength recommended by the manufacturer just before the crop emerges or by applying to the soil surface nicotine sulphate at 1 pint in 100 gallons of water plus an activator such as soft soap or summer oil. Home gardeners can water the soil with lindane 50 per cent wettable powder at ¼ oz in 3 gallons of water when the crop emerges.

Cutworms

Cutworms (*Agrotis ypsilon*) frequently damage carrot crops grown under cloches and frames in Nelson. They sometimes do damage in other situations. They can be controlled by the use of a bait made up as follows:

Bran	25 lb
Lindane (20 per cent dust)	4 oz
Molasses	2 quarts
Water	3 gallons

Spraying with DDT 50 per cent wettable powder (1 lb in 100 gallons of water) directed at the base of the plants is also a good method of control.

Cutworms can often be found curled up just below the soil surface near the damaged plants, as they do not move during the day. For home gardeners it is feasible to collect and destroy them.

Root-knot Eelworm

The root-knot eelworm (*Heterodera marioni*) is a microscopically small worm of the group called nematodes. It is very widespread in soils, as it feeds on more than a thousand different host plants, including both carrots and parsnips. Cultivation of the same crop on the same land for long periods can encourage the number of eelworms in the soil to increase to levels where they become a serious pest.

Symptoms of the presence of root-knot eelworms are numerous small galls or swellings on the roots of plants, which reduce the effectiveness of the roots and cause wilting and stunting.

Adequate crop rotation is the usual method of countering this pest. Field application of the soil sterilant DD has been found economical in trials on carrots by the Plant Diseases Division, but has not been practised commercially. Reports of damage by eelworms to carrots and parsnips are so far confined to the North Island.

Fungous Diseases

Carrot Leaf Blight and Leaf Spot of Parsnip

Carrot leaf blight (*Cercospora carotae*) and leaf spot of parsnip (*Cercosporella pastinacea*) attack the foliage, especially when plants are approaching maturity.

Vegetable washing machine in operation. Clean roots are being packed in the foreground.

Symptoms of carrot leaf blight are small spots of dead tissue showing no structure and no definite margin. These spots enlarge and combine into dead brown areas, finally killing many separate leaflets. A severely infected crop looks as if a blow torch has been passed over it. The disease is reported to be troublesome in Auckland, Pukekohe, and Hawke's Bay, and appears to be increasing.

In leaf spot of parsnips the spots are more definitely circular at first and show some ring structure. They soon coalesce into irregular areas and severe infections give a ragged look to the leaves. This disease occurs throughout the North Island and Nelson.

Both diseases can be controlled readily by spraying with bordeaux mixture made by adding 6 lb of copper sulphate and 8 lb of hydrated lime to 100 gallons of water. Alternative materials used successfully are copper oxychloride, zineb, and maneb at the strengths recommended by the manufacturers.

Violet Root Rot

Violet root rot (*Helicobasidium purpureum*) is reported to occur on commercial gardens in North Otago and in home gardens in Canterbury. There is no effective control of this soil-borne disease and carrots should not be grown again on infected land.

Bacterial Diseases

Bacterial soft rot (*Erwinia carotovora*) sometimes causes severe losses of carrots and parsnips in the field and during transport and storage. Its incidence is very much governed by weather and methods of handling.

The bacteria responsible for the disease live in the soil and are almost always there. They will attack a crop as soon as conditions become favourable and there is no economical means of controlling them. The bacteria are not themselves able to invade healthy tissue, but attack roots damaged by diseases, pests, or injuries caused by cultivation, harvesting, transport, or frost. In parsnips the trouble in its early stages is commonly called parsnip canker. The disease needs considerable periods of dampness for its full development.

It occurs in the North Island mainly in autumn and winter, especially in carrots and parsnips left in the ground or harvested and bagged with much damp soil adhering. It is reported as very destructive in Nelson. In Canterbury and North Otago, where main-crop carrots and parsnips are usually left in the ground until early spring, frost damage is common and is no great hazard on its own, but if it is followed by wet weather, soft rots will become widespread, usually in early spring.

Symptoms of the disease are rapidly spreading areas of slimy soft rot followed by total disintegration of roots. Measures that will limit spread of the disease are:

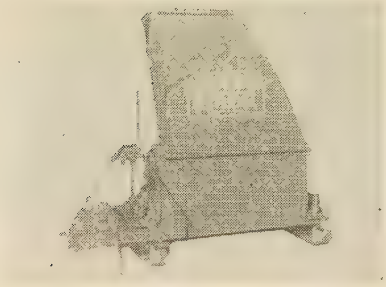
PROOF that you can make

SILAGE FOR AS LOW AS 4/6 per TON

with the new improved

DEKKER FORAGE HARVESTER

is contained in our fully descriptive booklet on Silage making. It'll *pay* you to get your copy right away.



Fixed Chute Model £265

CHECK THESE UNIQUE DEKKER FEATURES:

Trailer Model £470 (Hydraulic Tipping Trailer £60 Extra)

- ★ All operations from tractor seat.
- ★ Direct, no belt drive.
- ★ Safer on hillsides.
- ★ Large capacity (2 ton) trailer easily converts to farm trailer.
- ★ Electronically balanced rotor.
- ★ One-piece spring steel flails.
- ★ Low rotor speed—high efficiency.
- ★ Self-aligning, shock absorbing coupling between gear-box and rotor.
- ★ Positive adjustment of cutting height.
- ★ New draw-bar will off-set trailer model 3 feet and give sharper angle on turn.
- ★ Check chains on tension springs.
- ★ Hay chute which leaves the grass in wuffled windrow.

Other DEKKER models available to suit your method of Silage making:

Engine Driven model—with 34 h.p. V.W. engine **£580**; with 44 h.p. Porsche engine **£720**; without engine **£340**. Swivel Chute model **£294**. Cutter unit only **£248**.

Note: The Cutter Unit on each model is exactly the same. The one cutter unit will fit all models. (Prices in the South Island are plus freight charge.)

Get your copy of our Silage Making booklet today, from your local DEKKER Dealer—or write direct to:

MARTIN DEKKER ENGINEERING

P.O. BOX 2256, AUCKLAND. PHONE 49-159. TELEGRAMS 'MARTDEK'.

Avoiding cultivation injuries as much as possible from early autumn onward.

Growing main-crop carrots intended to be left in the soil for late harvesting on well drained soils only.

Avoiding unbalanced growth due to irregular water supply or to heavy applications of nitrogen.

Washing and drying carrots after harvest before bagging for transport and marketing.

Home gardeners in colder areas can avoid frost damage to the roots, which frequently gives the disease a chance to establish, by covering rows of carrots and parsnips with a few inches of leaves, sawdust, or straw.

Virus Diseases

Carrots suffer heavily from a virus disease called "motley dwarf". The disease was first identified in 1954 in Blenheim and it soon became clear that its incidence in the South Island was high, especially in carrots grown for early bunching. Infected plants show yellow mottling of the leaves and are severely stunted. As the disease progresses the leaves become dark purple to bright red and the roots are very small.

The virus is spread by the carrot aphid (*Cavariella aegopodii*) and is carried into the crops during the early flights of the aphids in September and October. There is a second flight in February and March, but as carrot crops then are nearly full grown, the virus infection has little effect.

Control of aphids during the early flight period will give good control of the virus disease, but spraying must be started very early in the life of the carrots, as the aphids can attack soon after germination. The first spray must be applied as soon as the seed lobes of the carrots have spread. Materials to use were described in the section on aphid control.

Cucumber Mosaic

Cucumber mosaic occurs occasionally on carrots in most parts of the country, but has not yet been known to be severe enough to cause significant monetary loss. It is also spread by aphids.

To date no virus disease has been recorded on parsnips.

December Work in the Home Garden

By A. G. KENNELLY,
Horticultural Instructor, Department of Agriculture, Dunedin

THOUGH there should be plenty of vegetables in the home garden in December, winter supplies should not be overlooked. Plants such as brussels sprouts, savoy cabbage, broccoli or winter cauliflower, kale, and leeks can be set out from December to the end of January in all except the most favoured districts, where later planting is satisfactory.

SOWING AND PLANTING

SUCCESSIONAL SOWINGS

Dwarf beans, beetroot, carrots, celeriac, Chinese cabbages, kohl rabi (where ground is not likely to dry out), lettuces, mustard greens, New Zealand spinach, radishes, silver beet, onions for salads, turnips.

OTHER SOWINGS

Parsnips (if seed has not yet been sown; it is now getting late in southern districts); swedes (sowing can be deferred in warm, dry areas); peas (where soil does not dry out).

SEEDLINGS OR TUBERS WHICH CAN BE SET OUT

Celery (self-blanching and the good-quality green which is now becoming very popular); tomatoes (where plants have not yet been set out); lettuce (where conditions are not too hot and dry for transplanting); summer cabbage; cauliflower.

Winter greens (except in mild northern districts) such as broccoli or winter cauliflower and savoy cabbage (several varieties of each to ensure succession); brussels sprouts; kale or borecole; leeks; cabbage for pickling.

A small planting of potatoes can be made, where ground is likely to remain moist enough for good growth, to provide new potatoes in late autumn or early winter.

MANY new weedkillers have been developed in recent years, but in the home garden hoeing is usually still the most effective means of weed control. Weeds in established crops deprive plants of food and moisture and often allow insect pests and diseases to carry over from season to season, so a sharp hoe should be used regularly between rows.

Liquid manure may be applied to most crops lacking plant food, and watering done as required. Water is particularly important for dwarf and runner beans, lettuce, and celery.

The pulling of main-crop rhubarb should cease early in the month, particularly where conditions are dry, though moderate pulling of ever-bearing varieties growing in rich, moist soils can continue through autumn.

Broad beans attacked by the fungus disease rust should be sprayed regularly with zineb. Rust is readily recognised by its rusty pustules and should not be confused with chocolate spot, a fungous disease which causes chocolate-coloured blotches on the leaves. Chocolate spot can readily be controlled by copper or thiram sprays.

Celery should be sprayed with zineb or copper oxychloride even before leaf spot appears. In the more humid districts potatoes should be sprayed with bordeaux mixture, copper oxychloride, or zineb for protection against late blight. The tubers should be kept well covered by moulding the soil to as sharp a ridge as possible.

Asparagus

Cutting of asparagus too heavily will reduce yields in subsequent seasons and many beds have been ruined in this way. Harvesting is usually done by cutting the shoots or spears a little below the ground with a sharp knife or asparagus cutter.

It is safe to cut half as deep as the top of the crown is below the ground. Cutting is usually begun when the spears are 6 to 8 in. above the ground. The spear is first gently pulled to determine its position and then it can be cut with one thrust without damage to other spears. In loose soil spears can be broken off, but this may damage the crown.

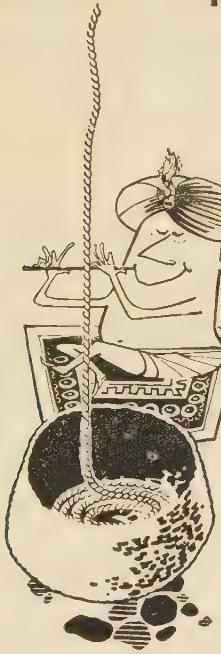
The butts of spears should be trimmed off, though the pieces can be used for flavouring soup. Cutting should cease early where conditions are dry or if the soil is poor.

Cucurbits

Melons and cucumbers are liable to suffer wind burn and sun scorch and, like pumpkins and marrows, need shelter for the best results in exposed situations or in cold districts. Withering and distortion of fruits are common early in the season or in cold districts. The trouble is most often due to overwatering or too moist, cold soil, which results in poor root development.

Members of the cucumber family require a soil temperature of not less than about 55 degrees F for good growth. Root and collar rot is also

Centuries ago Indians learned to work wonders with JUTE rope



Today you needn't be a swami to make Indian Jute work for you. Fishing lines to ocean liners, wherever the best rope is needed, Jute does the trick. But Jute's greatest magic is its versatility. Anywhere you go, you'll find Jute being used. Upholstering chairs, backing linoleum, packing the country's primary produce. Canvas, carpets, covers—bags, sacks, woolpacks. From India the whole world has learned the trick of using Jute.

PACK IT IN JUTE

Inquiries to
Indian Jute Mills Association,
P.O. Box 90, Dunedin.

IJ.13/61—2

PREM IS PRACTICAL

Sheepmen Everywhere use

PREM

DRENCH

PREM LIQUID PHENOTHIAZINE is widely acclaimed as a reliable, efficient and time-tested drench.

ORDER PREM NOW!

PREM LIQUID PHENOTHIAZINE (Fine Particle and Standard Grades) deals with all internal sheep parasites. **PREM** is renowned for its non-settling qualities . . . easy pouring too. Be wise, order **PREM** early this season. It's sure to be in greater demand than ever before.

PROTECT WITH PREM

PREM
LIQUID PHENOTHIAZINE DRENCH

PREM

LIQUID PHENOTHIAZINE

New Zealand Distributors:

PREMIER PRODUCTS LTD.
66 DIXON STREET, WELLINGTON

Obtainable from N.Z. Loan and Mercantile Agency Co. Ltd. (all branches) or your usual stock firm.

at last! —a Fully Galvanised Fence Batten

QUICK SECURE C·P·C SIMPLE PERMANENT

The C.P.C. batten is **completely** galvanised after manufacture.

No rust points, no wedges, no staples, no wire clips, no sliding along wires. Strong but light—bundles of 50 only 60 lb. Incredibly fast in use — wire simply fits in slots and is automatically locked

ORDER C.P.C. BATTENS

Through your Stock and Station Agent or from

WILLIAM CABLE LTD.
P.O. Box 101,
Petone.

FARMERS

There's NO substitute for a top-quality

DOG BISCUIT . . .

Once tasted nothing wasted—a balanced feed for every breed.

P.1431

Available everywhere. Trade inquiries:
A. J. PALMER & CO. LTD., Christchurch.
SUMMIT PRODUCTS, Palmerston North.

"SHEP"

liable to be specially troublesome early in the season and in cold, wet ground.

Kumaras

Kumaras are usually propagated by rooted shoots or slips which can be bought from seedsmen from about mid October in areas suited to the plant. December is rather late for planting in most districts.

The soil for kumaras should be of a type that warms readily, and light or sandy loams are usually preferred. Organic manure applied to a previous crop gives most satisfactory results and in most soils it should be supplemented with a dressing of bone meal or superphosphate, as trials indicate that kumaras need a good deal of phosphate, though the need for potash seems to depend more on soil type. Very little nitrogen is usually required and an excess promotes top growth at the expense of tubers. As roots are very sensitive, fertiliser should be well worked along the rows a week or two before planting.

Planting can be done on the flat, but where there is no danger of soil drying out plants are usually set out on broad, low ridges, which warm quickly and facilitate digging. Apart from weed control and the repair of broken ridges, cultivation is unnecessary, though vines are usually lifted occasionally to prevent their rooting, as such rooting appears to favour leaf rather than tuber development.

Onions

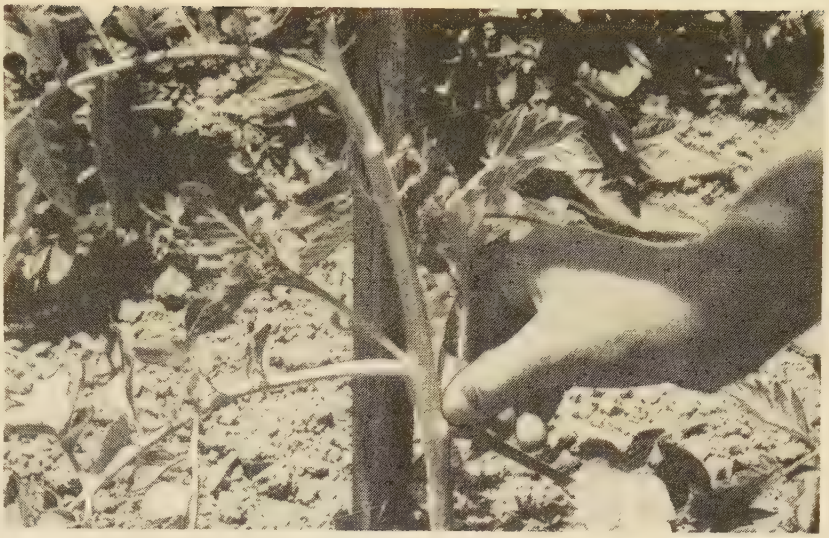
Weeds among onions that have not yet reached maturity tend to deprive the bulbs of plant food and tend to hinder ripening. Onion crops that were planted late or are still growing well should be kept free of weeds and pests and diseases.

Sweet Corn

Sweet corn thrives in warm, sunny conditions, and within limits the higher the temperature is and the more sunlight it receives the more likely it is to succeed. Though not hardy, sweet corn is less sensitive to cold than either the tomato or the snap bean. It can therefore be grown by home gardeners in most parts of New Zealand, though few in the far south do so.

Seed should be sown 1 to 2 in. deep. If planted in rows, plants should be 12 in. apart and the rows 36 in. apart; clumps should be 36 in. apart. Though it is usually advisable to sow about seven or eight seeds at each clump to allow for failures, only four or five of the strongest plants should be left after they reach a height of about 2 in.

Sweet corn matures in about 70 to 120 days and seed can be sown successionally. Plants are not specially sensitive to drought and usually bear earlier on light, sandy, or peaty soils.



[Sparrow

Side shoots should be removed from tomatoes while they are small. They are best held so that the fingers do not touch the remainder of the plant, because virus disease can be transmitted by the fingers.

Suckers often develop at the bases of plants during autumn and home gardeners sometimes remove them in an effort to increase the size and encourage early development of the cobs. However, usually the practice is more likely to result in loss than gain, as removal of large suckers results in loss of plant tissue which is capable of converting nutrients into substances which go to the development of the cobs. It may also result in serious plant damage.

Tomatoes

Young tomato plants should be watered moderately until they are well established and they should be watched for infestation with insect pests or infection with disease. Lindane spray controls aphids and caterpillars. DDT controls most active insects such as caterpillars and is longer lasting than lindane.

Side shoots are best removed while they are small, but to reduce the like-

Sweet corn can be grown by home gardeners in most parts of New Zealand. Though not hardy, it is less sensitive to cold than tomatoes.

lihood of transmitting virus disease on the fingers, side shoots should be grasped between the thumb and forefinger and bent so that they snap cleanly without leaving stubs in the joints of the leaf branches. Fingers should not touch any other part of the plant except side shoots before their removal. Plants with malformation or mottling of the leaves should be destroyed, as they may be infected with virus.

Where late blight is liable to be troublesome plants can be sprayed with a copper spray or with zineb. The latter is also effective in controlling the disease leaf mould.

Winter Vegetables

Brussels sprouts, kale (borecole), savoy cabbage, and broccoli (heading and sprouting) deserve more attention than they receive in most home gardens. They are high yielding and after establishment require comparatively little attention. The soil for them should be enriched some time before planting by the thorough incorporation of well rotted organic manure. Fairly heavy loams that are well drained and suitably enriched are usually preferable.

Though plants are not difficult to raise from seed, most gardeners prefer to buy them. They are available from seedsmen for setting out in December, January, and in the more favoured districts in February and March.

Leeks

Though leeks can be set out earlier and, in districts where autumn is long enough, later than December and January, these are the preferred months for planting. In most districts an early, a mid season, and a late planting will ensure a supply of leeks from autumn until spring.

Leeks are a good standby and are very easily grown. They are rarely affected by insect pests or diseases, and though cabbage and cauliflower (or broccoli) mature according to their season and are available or in best condition only then, leeks will stand for many months and may be used as required.

The soil for leeks should be rich, preferably in organic manure, but where the water table is high enough excellent crops can be grown with artificial fertilisers alone.

Varieties include London or Broad Flag, which is best grown for early use; Musselburgh, which is a very hardy variety usually characterised by its long, blanched stem; and Lyon, which is generally similar to London but grows larger and is slower maturing. Lyon is a good variety for a late crop, as it is slow in running to seed.

Only One Better than N.Z. Ploughman

H. A. MAGSON, of Rokeby, Mid Canterbury, recorded the best performance so far by a New Zealand representative when he was second in the world ploughing championship held at Grignon, France. The event, in which 32 competitors from 17 countries took part, was won by a Canadian, W. Dixon, with 144.1 points. Mr Magson scored 140.5 points.

Before he left for the contest Mr Magson was farewelled by the Prime Minister, Mr Holyoake. They are shown above with Mr E. J. Melrose (middle), New Zealand manager of the Atlantic Union Oil Company, which sponsors the championship, and Mr J. S. Marshall jun. of Waianiwa, Mr Magson's manager.

"Proceedings of Ruakura Farmers' Conference Week 1961"

THE crowded sessions at this year's Farmers' Conference at the Department of Agriculture's Ruakura Animal Research Station were impressive evidence of the advantages of receiving new agricultural knowledge first-hand.

This year's Conference reverted to a four-day programme by reintroducing the Conference for All Farmers in addition to the Sheep Farmers' Conference, the Dairy Farmers' Conference, and the Field Day.

Farmers who could not attend the Conference can now obtain the papers presented there in the "Proceedings of the Ruakura Farmers' Conference Week 1961".

Of 238 pages, the "Proceedings" contain papers by acknowledged experts, with up-to-date information of interest and value to all farmers. Subjects of topical interest include progress in facial eczema research, three papers on multiple shearing, and a two-paper symposium on beef production in addition to a separate paper on production of beef and veal from dairy farms. The increasing emphasis being placed on beef production in New Zealand gives added value to these papers.

Another two-paper symposium gives United Kingdom and New Zealand viewpoints on the European Common Market.

In all 26 papers were presented at the Conference, and the "Proceedings" include the informative discussions which followed most of them.

Interested farmers can be assured that as in previous years the "Proceedings" would make a valuable addition to their collections of technical books.

The "Proceedings" can be obtained from Publications Section, Department of Agriculture, Box 2298, Wellington, or from Ruakura Animal Research Station, Private Bag, Hamilton, for 10s. a copy, post free.

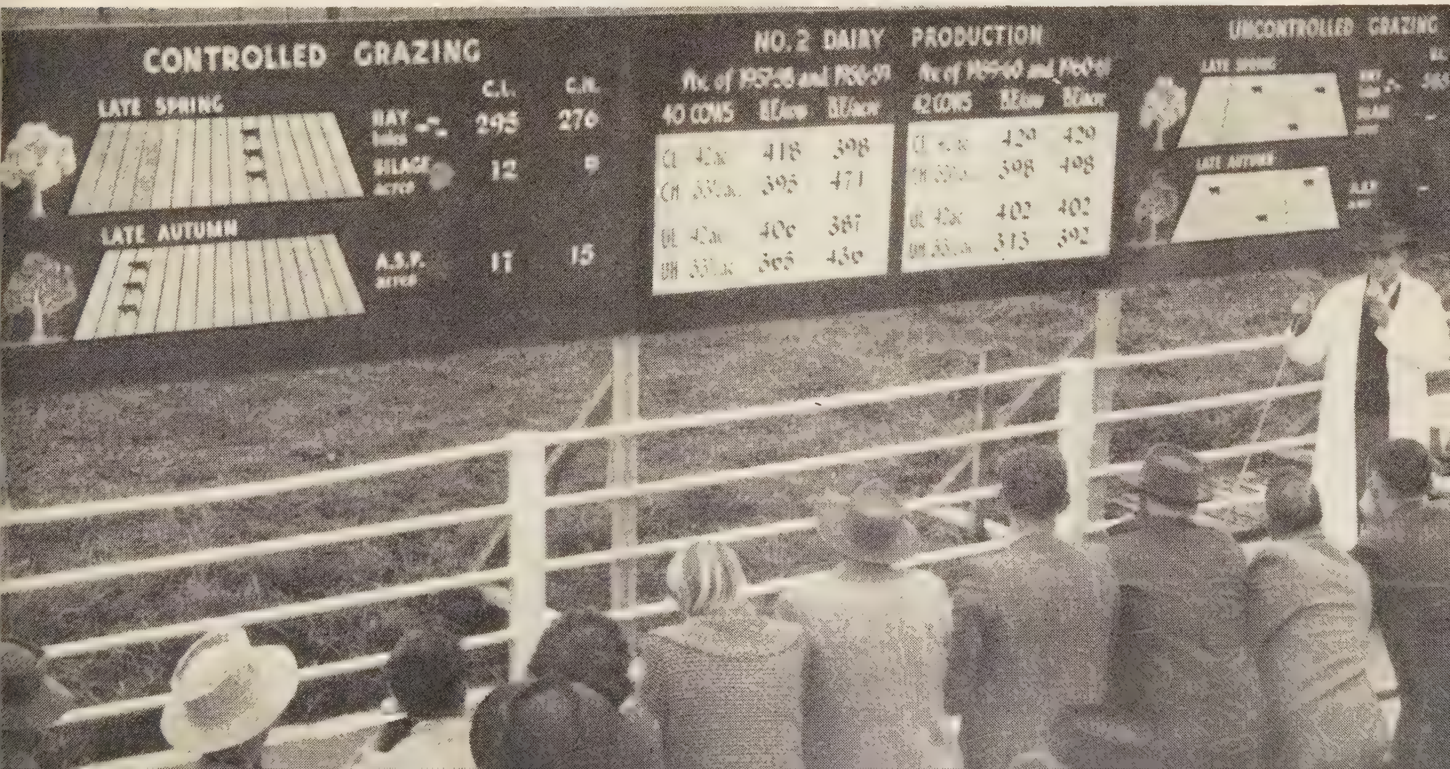
". . . No more powerful force for good and evil exists than control of the stocking rate in grassland farming. Properly understood and used, it can influence productive efficiency for good more than any other single controllable factor. Misunderstood and misapplied, it can lead to abuses which may have permanent harmful effects on land use." Quoting this from his recently published book "Grass to Milk", Dr C. P. McMeekan (right), Director, Department of Agriculture's Ruakura Animal Research Station, introduced his paper to the 1961 Ruakura Farmers' Conference in which he reviewed Ruakura's investigations into the influence of stocking rates on dairy production. An adaptation of the paper follows.

The Pros and Cons of HIGH STOCKING RATE

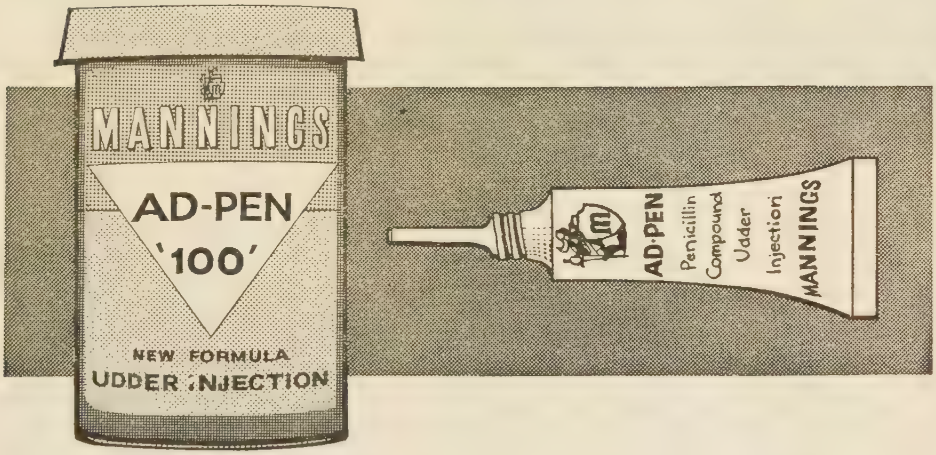
WE first became conscious, in a scientific sense, of the key role of rate of stocking or "carrying capacity" in relation to production per cow, per acre, and per labour unit as a result of field surveys conducted about 30 years ago. Farmers had found in the hard school of practical experience that their success was closely related to the number of animals carried on their farms. Analysis of the vital statistics of those days revealed that on the average farms that were being operated at high per acre levels of output carried a larger number of cows per 100 acres.

Several similar and more intensive surveys on the factors affecting the efficiency of production from New Zealand dairy farms that have since been conducted have all restressed the basic importance of relatively high stocking rates.

▼ Fifteen years' investigations into dairy cow grazing management at Ruakura's No. 2 Dairy have comprised six completed studies in which stocking rate was the only or major variable. This scene at the 1961 Ruakura Farmers' Conference field day at the Station is typical of continued and increasing farmer interest in the data that have been presented since the conferences started in 1949.



FOR OBSTINATE CASES OF MASTITIS



AD·PEN

Penicillin PLUS

NEW FORMULA UDDER INJECTION

AD-PEN IS PENICILLIN PLUS: It is an improved combination of penicillin and a powerful anti-bacteria agent. This combination is effective against a much wider range of bacteria than penicillin alone, and is also effective against many cases of staphylococcal mastitis, which are resistant to the ordinary penicillin treatment.

MANNINGS VETERINARY LABORATORIES, HAMILTON.

Effectiveness of New Penicillin Plus Proved Under Test

Combined with Penicillin, a unique and powerful, broad spectrum anti - bacterial agent, displays decisive effectiveness against Mastitis — inducing organisms often resistant to other therapeutic agents. Experiments have shown the anti-bacterial agent used to be effective against Mastitis due to pathogenic (Staphylococci aureus). From four studies made on herds where there were outbreaks of Mastitis, 86% of the quarters affected with Staphylococci became negative following therapy. In this particular test covering a six months period, 32 cows having a total of 60 infected quarters were treated.

Extensive study has shown it to be quite non-irritating to the quarter. Its broad spectrum activity combined with the specific anti-streptococcal action of penicillin, seem to be an ideal combination for treatment of staphylococcal and other types of obstinate Mastitis.

This new combination (Penicillin and anti-bacterial agent) is now available in Mannings AD-PEN Penicillin Bactericide udder injection for the treatment of obstinate cases of Mastitis. AD-PEN contains a powerful anti-bacterial agent (bactericide) combined with penicillin. The combination attacks a much wider range of bacteria than penicillin alone, and is therefore effective against many cases of Mastitis which do not respond to the ordinary Penicillin treatment.

AD-PEN '100' is packed in clear plastic containers, each containing 1 dozen small, single-squeeze tubes with fine, smooth nozzles.

Evidence from Ruakura Experiments

No experimental examinations of the issue and the many problems involved, however, were undertaken until Ruakura began these some 15 years ago. Since then six major dairy cattle studies have been completed which have involved differences in the rate of stocking as the major or only experimental variable. Without exception, these studies have shown that a strong relationship exists between high stocking rates and high per acre outputs. This conclusion is now fully supported by grassland workers of Europe and North America. The mechanisms which underlie the key importance of stocking rate and which have become evident as our studies have progressed may be summarised as follows:

First of all it is essential to remember that the basic process of the dairy industry is the conversion of grass to milk. In this process three main forces operate:

1. The amount of grass grown.

2. The proportion of this that is passed through the animal, and

3. The efficiency with which the grass eaten is converted by the animal.

The dairy farmer's job is to grow as much grass as widely distributed over the year as possible, to feed as much of this as he can to his dairy cattle, and to ensure that these cattle have the necessary characteristics for high per animal efficiency. The stocking rate is one of the controllable weapons the farmer can use to help him attain high levels of efficiency in each of these three categories.

More Stock = More Grass = More Stock

There is ample evidence and experience to show that high-producing pastures are obtained in New Zealand only with the use of the grazing animal. The dung and urine returns of grazing stock, the consolidation and cultivation from their hooves, and the influence of grazing on pasture composition all interact to affect the amount and type of grass grown. Sir Bruce Levy stated as the elements of his 30-year fight to build better pastures in this country: "The more stock, the more dung and urine; the more dung and urine, the more grass; the more grass, the more stock". This is as true today as it was then.

The proportion of the grass grown that is actually harvested by the animal is materially influenced by the number of grazing mouths used for the job. A pasture is composed of very large numbers of individual plants. Each of these is both growing and dying at the same time, and in an ungrazed or under-grazed pasture the build-up of dead material can reach very high proportions. In summer it can amount to over half the total dry matter in the field. It is always greater in laxly grazed pastures. Such material might as well never have been grown. When grass is grazed as it grows, or grazed quickly, after it is grown, under a rotational plan, by sufficient mouths, the ratio of fodder consumed to fodder grown is markedly increased.

At Ruakura we have been able to measure the daily intake of grazing cattle under different stocking rates. One such experiment is typical. Increasing the stocking rate by 50 per cent gave an increase in the amount of grass consumed per acre of over 40 per cent. This work was done on strictly comparable pastures where the only difference operating was that of stocking rate.

Stocking Rate and Animal Efficiency

Stocking rate helps, too, on the animal efficiency side in an indirect way. Stocking at high rates rather than low results in less total feed being available to each animal. Over a long period this results in a lower average body-weight. A very high proportion of the total feed consumption of a dairy cow is used for maintenance, so that the smaller the cow is, the less is this overhead cost. Within the practical limits used so far at Ruakura body-weight reductions of 100 to 200 lb per cow have been typical of high stocking rates. Such lightweight animals convert food more efficiently than heavier beasts. In practice this factor tends to counteract the loss of efficiency coming from lower production per animal under conditions of reduced feed intake.

In the example just quoted, a 50 per cent increase in stocking rate on a rate that was already high lowered per cow production by 20 per cent, but increased per acre production by 26 per cent. It is important to appreciate this interaction of stocking rate and production per cow with the resultant effects on per acre yield. As the rate of stocking goes up production per cow must go down. In practice, however, unless stocking rate is carried to extreme heights, the increases per acre coming from the causes just enumerated outweigh the handicap of lower per animal yields and result in overall greater efficiency.

Limit on High Stocking Rate

Attention must be drawn to the very obvious fact that there must be a limit to the extent to which stocking rate can be increased with corresponding increases in per acre yield. In other words, the law of diminishing returns must apply to this situation, and a point will eventually come when further increases in the number of animals carried will be associated with such a large reduction in per cow output that production per acre first levels out and then falls.

We have been very interested at Ruakura in trying to see if this really happens in practice, and over the last few years our data have demonstrated that it does. We have actually depressed per acre yields by pushing the stocking rate up too high. The precise point at which breakdown occurs will vary for every farm and will depend on the level of productivity of the cattle concerned, the production of the pastures concerned, and the impact of continued severe close grazing on pasture productivity.

Set Stocking and Controlled Rotational Grazing

Perhaps the most important practical observation that we have made is that the point at which stocking rate will break down appears to be reached earlier under set stocking grazing management than it is under controlled rotational grazing. For example, we have not so far been able to "bust" high stocking under controlled grazing at No. 2 Dairy. The high-rate controlled farm, carrying 42 milking cows on 33½ acres, has been the highest producing of the four over the last four years. Its output has averaged 485 lb of fat per acre and in one year averaged 522 lb of butterfat per acre at the pail.

In contrast, the high-rate set-stocked farm has produced little more than its low-rate counterpart over the four years and has fallen below it over the last two years by 10 lb of fat per acre. This fall has been due to a reduction of 70 to 80 lb per cow, more than sufficient to offset the larger number of cows carried.

Farmers seeking to take full advantage of the inherent superiority of rotational grazing over set stocking thus have an additional card up their sleeves, in that it is probable they can exploit the potentials of high stocking rate more completely and with fewer risks. This conclusion is tentative and requires further checking. This checking will be done at Ruakura in the next four years. I have every confidence, however, that the point will be confirmed.

I believe the general principles outlined apply throughout all our dairy-

AVAILABLE THIS DIPPING SEASON

ASUNTOL®

AN APPROVED DIP

OVERSEAS AND IN NEW ZEALAND

Asuntol is the name given to a highly efficient insecticide discovered and developed in the world-famous Laboratories of Farbenfabriken, Bayer A.G. Leverkusen, Germany. Since its discovery in 1956 Asuntol has been extensively used with success in most sheep and cattle raising countries of the world to control ecto-parasites on sheep and cattle. No reinforcing is required with Asuntol because of its high stability and exceedingly low stripping factor—RESULTING IN LOW COST DIPPING.

★ Highly effective against Lice, Keds, Cattle Tick and Sheep **Blowfly.**

★ No costly reinforcing **required.**

★ SAFE for all stock.

★ No residue problem.

★ Stable in the dipping bath and retains its efficiency for many months if required.

★ Can be used in either hard or soft water.

★ An approved product—Asuntol is Registered Pursuant to The Stock Remedies Act 1934.

A PRODUCT OF

FARBENFABRIKEN BAYER A.G. LEVERKUSEN GERMANY

Sole N.Z. Importers **HENRY H. YORK & CO. PTY. LTD.** (inc. in N.S.W.)

®REGISTERED TRADE MARK AUCKLAND WELLINGTON CHRISTCHURCH
]

ing country. The only real difference that will occur in the different regions will be in degree rather than in kind. Some country can use the high stocking weapon more effectively than others, because of specially suitable soil types and contour. The pumice country is an example. In some areas opportunity is more limited owing to the amount of the grass crop, but on all types of country it must be true that high rather than low stocking rates will pay off.

Factors Limiting High Stocking

While I am generally of the opinion that a large proportion of dairymen have not yet learnt to appreciate the full possibilities of increased efficiency through the simple expedient of increasing the number of cows milked on their farms, I am aware that to do so might not be the immediate answer to low production in many cases.

Thus the limitations to production of a particular property may, as just stated, be the amount of grass grown, and this is responsible for the low herd yields resulting. It would obviously be futile to place further stress on the pastures concerned by putting on more stock. In such cases improved pasture production technology must be attended to first.

Again, poor milking management or poor husbandry may be the prime causes of low per cow production and low herd yields. These should be corrected before recourse is had to higher stocking rates. Increasing the size of the herd under such conditions would merely serve to aggravate an already impossible situation.

Again, farms with clay soil types so badly drained and so heavy that it is hard to keep existing cattle on top of the grass must preserve a much more delicate pasture/stock balance if the effects of pugging are not to offset the advantages of better harvesting by more animals.

Farms of difficult contour will earlier hit the point where more stock will not pay off than will farms where it is easier to conserve sufficient reserves of silage and hay.

Farms in drought areas, particularly where droughts are periodic rather than regular, are similarly limited, and cannot afford too many risks because of the sheer necessity of maintaining high reserves of fodder from periods and areas of plenty for use in times of scarcity.

Finally poor herd quality may be a limiting factor in association with one or more of those factors just mentioned. We have some evidence that good cows stand up better to adversity than do poor cows.

On all these types of property raising stock numbers before correcting the weaknesses existing would be dangerous.

All these, however, are special cases. The vast majority of dairy farms in our well established dairying zones do not fall into any of these categories. On many of them the stocking rate weapon cannot be neglected. It can be used. It is not unreasonable—indeed, it is extremely important—to suggest, however, that in applying the principle of attacking production per acre through stocking rate farmers should be sensibly cautious. They should increase gradually. They should ensure that an adequate supply of feed reserves of hay and/or silage is on hand to take care of the increased numbers. They must appreciate that in this approach to increased efficiency, experience will come only from practice.

Radio Broadcasts for Farmers during December

RADIO broadcasts for farmers will be given during December as follows:

1YZ Rotorua, 7.15 p.m.

6 December—“Young Farmers' Clubs”, by Piako Y.F.C. district committee.

2XP New Plymouth, 8 p.m.

1 December—“News and Views from the Farm Advisory Division”, by C. Christie, Farm Advisory Officer, Department of Agriculture, Stratford. P. Weenink's Y.F.C. session.

15 December—“Animal Husbandry Notes”, by A. R. Murdoch, Livestock Instructor, Department of Agriculture, Stratford.

22 December—“Radio Vet.”, by J. H. Macdonald, Veterinarian, Department of Agriculture, New Plymouth.

2XG Gisborne, 8 p.m.

12 December—“For the Orchardist”, by J. Overbye, Horticultural Instructor, Department of Agriculture, Gisborne.

19 December—“Stockowners' Question Time”, by E. B. Smythe, Livestock Instructor, Department of Agriculture, Gisborne.

2XA Wanganui, 8 p.m.

7 December—“For the Country Women”, by Mary Macdonald.

14 December—Farming News.

2YZ Napier, 7.10 p.m.

5 December—“Farming Editor's Summary”, by R. G. Montgomery, Sheep and Wool Instructor, Department of Agriculture, Hastings.

2XB Masterton, 6.45 p.m.

6 December—“Trace Elements and Farming”, by F. G. Spite, Farm Advisory Officer, Department of Agriculture, Masterton.

3YA Christchurch, 12.20 p.m.

4 December—“Stock Diseases”, by A. C. Howse, Veterinarian, Department of Agriculture, Christchurch.

4YA Dunedin and 4YZ Invercargill, 12.36 p.m.

4 December—“Pasture Conservation”, by W. C. Faithful, Instructor in Agriculture, Department of Agriculture, Invercargill.

11 December—“The Year in Horticulture”, by I. G. Forbes, Assistant Horticultural Superintendent, Department of Agriculture, Dunedin.

18 December—“Review of Season”, by D. H. Le Souef, Livestock Superintendent, and G. K. McPherson, Fields Superintendent, both of the Department of Agriculture, Dunedin.

Regular Sessions

1YA Auckland, Mondays at 12.36 p.m. (“Country Journal”, including “Report from Ruakura”), Tuesdays, Wednesdays, Thursdays, and Fridays at 12.33 p.m. (“Country Journal”), Thursdays at 12.33 p.m. (“News for the Farmer”).

1XN Whangarei, Mondays at 8 p.m. (“Northland Stock Market Report”, followed by “Farming for Profit”), Wednesdays at 8 p.m. (“Farming for Profit”), and Fridays at 12.33 p.m. (“Farm News”).

1XH Hamilton, Mondays at 12.36 p.m. (“For the Farmer”, excluding first Monday in month and public holidays), Wednesdays at 12.33 p.m. (“Report from Ruakura”).

1YZ Rotorua, Wednesdays at 7 p.m. (“Bay of Plenty Journal”), Thursdays at 12.33 p.m. (“News for the Farmer”).

2YZ Napier, Tuesdays at 7.10 p.m. (“The Hawke's Bay Farmer”), and Thursdays at 12.33 p.m. (“News for the Farmer”).

2XG Gisborne, Tuesdays at 8 p.m. (“Farm Session”).

2XP New Plymouth, Thursdays at 8 p.m. (“Farm Session”).

2XA Wanganui, Mondays at 8 p.m. (“For the Man on the Land”), Tuesdays at 8 p.m. (“Farm Supplement”), and Thursdays at 8 p.m. (“Farm Topics”).

2XB Masterton, Mondays and Wednesdays at 12.33 p.m. (“Country Journal”), Wednesdays at 6.45 p.m. (“Masterton Stock Market Report”), Fridays at 7.45 p.m. (“Wairarapa Stock Market Report”).

2XN Nelson, Thursdays at 8 p.m. (“Nelson Farm Topics”).

2ZA Palmerston North, Mondays at 12.36 p.m. (“Country Digest”), and Fridays at 8.30 p.m. (“Country Digest”, including Feilding stock market report).

2YA Wellington, Mondays, Tuesdays, and Fridays at 7.10 p.m. (“Farm Session”), Thursdays at 12.33 p.m. (“News for the Farmer”).

3YA Christchurch, Mondays at 12.20 p.m. (“Country Session”), Thursdays at 12.33 p.m. (“News for the Farmer”), and 7.10 p.m. (“Home Paddock”).

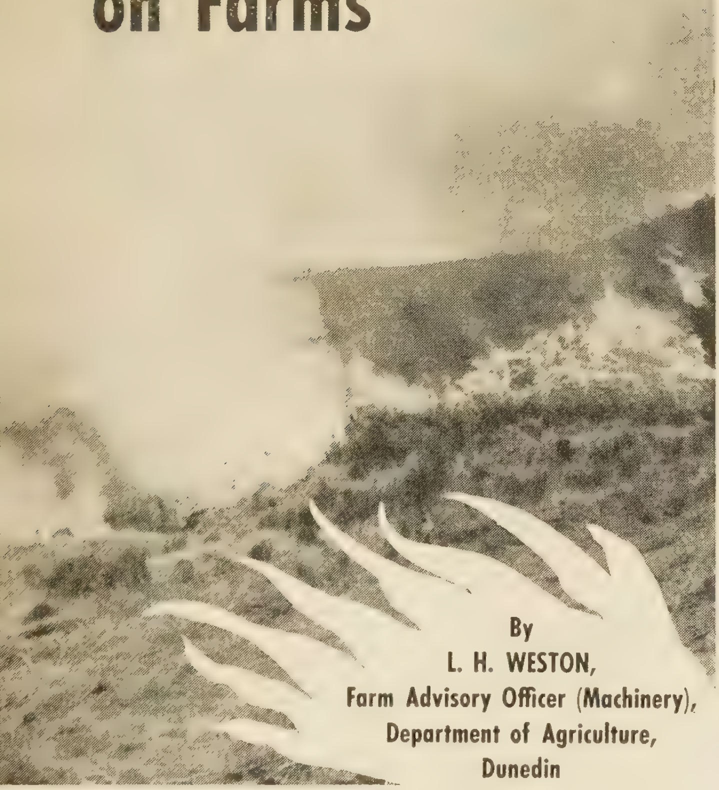
3XC Timaru, Wednesdays at 8 p.m. (“Farmers' Weekly News Service”), and Saturdays at 10.30 a.m. (“Country Mailbag”).

3YZ Greymouth, Mondays at 12.36 p.m., Thursdays at 12.33 p.m. (“News for the Farmer”).

4YA Dunedin, Mondays at 12.36 p.m., Tuesdays at 12.33 p.m., Wednesdays and Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.36 p.m., Wednesdays and Thursdays at 12.33 p.m. (“News for the Farmer”).

Fire Prevention on Farms



By
L. H. WESTON,
Farm Advisory Officer (Machinery),
Department of Agriculture,
Dunedin

DAMAGE amounting to over £2 million is caused by fires in New Zealand every year. Fires on farms account for losses of anything up to £400,000. Even more serious is the loss of life. There have been 20 deaths on farms due to fires over the last 10 years, half of which were young children. These losses can be reduced by eliminating many causes that can be easily remedied; educating the children and public; and taking precautions so that any outbreak of fire will be confined and quickly extinguished.

- **Reduce the danger of fire by:**
  Maintenance and tidiness of house and buildings
  Safe storage and handling of inflammable materials
  Special precautions against fires starting and spreading
  Educating the public, children in particular
  Providing fire-fighting equipment

- **Major causes of farm fires in New Zealand:**
  Fireplaces and stoves
  Electrical installations
  Matches and cigarettes

- **Major causes of farm fires in England:**
  Children playing with matches
  Rubbish fires and burning off
  Incubators and brooders
  Engines and railway locomotives
  Lamps, stoves, fires, and flues
  Matches and cigarettes
  Electrical faults

Protection against Fire

Buildings

Use fireproof construction and materials as much as possible.

Stoves, fireplaces, chimneys, and electric appliances should be properly installed and kept in good repair, especially in old houses.

Space buildings 50 yd apart and not in line with prevailing winds.

Use evergreen trees for windbreaks close to houses.

Don't let rubbish accumulate in or around buildings.

Store all fuels and oil in a special shed or tanks outside.

Fit a lightning arrester on radio aerials and a lightning conductor to any exposed building lacking a metal roof, making sure of a good ground connection.

Install a fire alarm that will waken you and the family, especially if the house is an old wooden one.

Provide carbon dioxide and water extinguishers for use indoors, and other equipment to combat more serious outbreaks.

Petrol and Oil

Install an underground tank 2 ft deep for large quantities of petrol, or an outside tank on a stand for diesel fuel.

Store drums of petrol and oil in a small fireproof building at least 50 yd from other buildings.

Store drums bung uppermost. Try not to damage the drums, and watch for leaks.

Mark cans clearly so that there is no doubt as to the contents.

Provide ventilation at ground level. Soak up spillages with sawdust and sand. Keep hoses and tanks in good repair.

Provide electric light (with an outside switch) if fuel is required at night. Beware of matches, candles, or lamps in the fuel store.

Display "No Smoking" and "Switch off the engine" signs. Provide a foam extinguisher of 2-gallon capacity, or equivalent dry powder extinguisher.

Shelter Belts and Plantations

Protect with 20 ft wide firebreaks of ploughed ground or green crop during a dry summer.

Use fire resistant trees such as Japanese larch around buildings and as firebreaks.

Divide plantations into 5- to 10-acre blocks with roadways and firebreaks between them.

Build dams and provide water tanks, pumps, and hoses (⅝ in. nozzle).

Clean up and care for the plantation and shelter belts.

Plant any ash and sycamore trees well away from buildings. If they catch fire in the summer, burning bark may shoot off 50 ft or more.

Crops and Hay

Use firebreaks 10 to 20 ft wide of green crop or ploughed ground to split up large grain areas.

Warn men about cigarettes, matches, and sparks from tractors and motors.

Do not store out-of-condition hay or seed in sheds; cover it in the paddock if necessary.

Keep equipment, weed sprayer, tanker, pumps, hoses, and beaters ready for instant use when conditions are tinder dry.

Engines and Railway Locomotives

Trucks, tractors, farm machines, and engines can cause fires when they backfire. Exhaust pipes may become red hot, or if they are faulty, they may send out sparks. Spark arresters are available, but vertical exhausts are less likely to cause fires, so are preferable on tractors used for harvesting.

Floors of garages and sheds should be kept clear, as a backfire may set litter alight. Motors and exhausts should be kept in good order, as a blow back through the carburettor may set the engine on fire. A fire extinguisher or a tin of "dry powder" can be carried on every machine.

Care should be taken when refuelling with petrol; preferably wait until the engine is cool.

Land bordering a railway track should be as free from hedges or scrub as possible. Steel and concrete fences and gates are a good investment near railway lines.

Spontaneous Combustion

Hay usually catches fire because of lack of conditioning; but sometimes good hay becomes wet and heats.

Hay baled and stacked green with a moisture content over 25 per cent is liable to heat and catch fire. Respiration of live plant cells causes a rise in temperature favouring the increase of bacteria. If there is sufficient moisture, these micro-organisms will continue to thrive and cause heating up to 158 degrees F. Chemical oxidation begins at 104 degrees F, but gains enough momentum at 158 degrees F to take the temperature higher if fresh air and sufficient oxygen penetrate the stack.

Danger of fire from this cause occurs between 35 and 70 days after stacking. Silage made from dry, wilted material not sufficiently consolidated and sealed may overheat in the same way.

Rain penetrating the stack or rising flood waters can cause out-of-season fires. Mould growth is the cause. Hay fires can be prevented by:

Complete curing of hay.

Leaving bales in the paddock until the moisture content is below 25 per cent. (Low to medium density bales or round bales with soft centres condition more readily than standard bales.)

Stacks and sheds should be sited above flood water danger and be adequately covered.

Damp or Oily Rags

Damp cotton rags in warm weather may be a breeding ground for bacteria, and heat. Rags soaked in vegetable oils such as linseed or the tung oil used in varnishes heat readily due to chemical action and, if in a confined space, catch fire. Rags used to mop up fish oils are dangerous too.

A carbon dioxide extinguisher demonstration. The appliance is effective in kitchens and workshops for extinguishing blazing liquids and electrical and other small fires, but is less satisfactory on porous materials or when used out of doors.

Bags that have held oily stock feeds, linseed cake for example, can also catch fire spontaneously.

Coal

Coal may absorb oxygen from air and heat. Impurities such as sulphur may increase fire risk. Heaps of slack are particularly dangerous.

Coal should be stored in a concrete bin not over 4 ft deep.

Chemicals

Quicklime has caused fires when moisture has penetrated to the chemical because of careless storage.

Many less common chemicals can combine spontaneously to start fires. They should be stored carefully where children cannot get them.

Animals

Calves and other livestock should be prevented from entering farm buildings. They may knock over a blowlamp, for instance, or their hooves may damage electric flex on the floor.

Explosives

An excessive charge of explosive used for log splitting can spread smouldering splinters over a wide area.

Lightning

Very occasionally in New Zealand farm buildings have been struck by lightning and have caught fire. Where buildings have high trees nearby (evergreens are particularly valuable), the trees are a safeguard, saving the buildings from lightning damage.

In America lightning rods are standard equipment for high buildings, but a galvanised iron roof well grounded by a down-pipe is as good. In New Zealand it would pay to fit a lightning conductor to a building with a tiled or bituminised fabric roof or in an exposed position with no high trees nearby. (The earth rod should reach moist soil.)

Crops near harvest, particularly those with a dry straw are a fire risk, and though shelter belts are a safeguard, precautions could well be taken in a dry season to fight fire in crops, and breaks to divide large blocks of grain crops are a good idea.

Welding Equipment

Welding on a wooden floor is particularly dangerous. Sparks and molten metal shot out on to oil or litter on the floor during welding may set it alight. Misdirection of the gas welder or contact with red-hot metal can set clothing or buildings alight.

Glass

Broken bottles magnifying the sun's rays cause many fires, often mysterious in their origin at the time. General tidiness and an occasional clean up along roadsides help to mitigate this danger.

Imperfections in the glass of windows and doors, particularly ornamental cut glass, may at times form a lens capable of igniting inflammable material close behind it. Fire-resistant curtain materials obviate such danger.

Household Gas

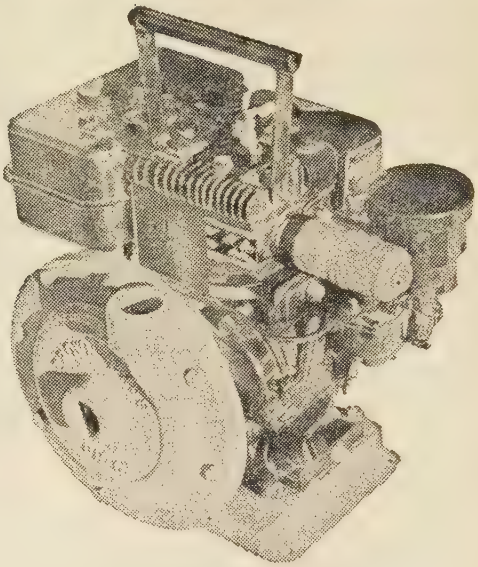
Leaky fittings and faulty jets are a fire danger in gas installations. Gas cylinders are best kept in a concrete bin outside the house.

High Tension Power Lines

High tension power lines are far more of a hazard than ordinary power lines. At least one instance is known of a haystack built beneath a high

IDEAL for every farm pumping purpose

ENGINE DRIVEN
AQUAMASTER
CENTRIFUGAL PUMPS



IRRIGATION

FIREFIGHTING

COW YARD WASHING

WATER TRANSFER

. . . The Aquamaster performs all farm watering tasks with pronounced reliability and convenience. Extremely portable and versatile . . . can be put to a wide range of uses on the farm and do them with outstanding distinction. (Equipped with the famous Briggs & Stratton 4 cycle engine). Write for full information now

BROWN BROS. ENGINEERS LTD.
P.O. BOX 548 CHRISTCHURCH.

Please send me full details on the engine driven Aquamaster pump.

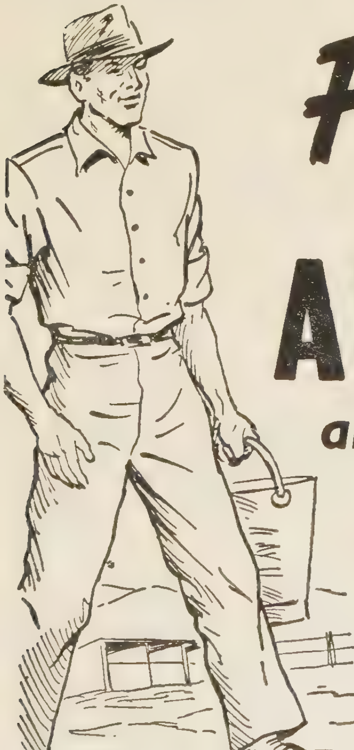
NAME ____________________

ADDRESS____________________

Brown Bros.
ENGINEERS LTD.

Pumping machinery specialists since 1908.
590 Colombo Street, Christchurch.

8138



Farmers!!

STRONG • TOUGH • DURABLE

ANSON BOOTS

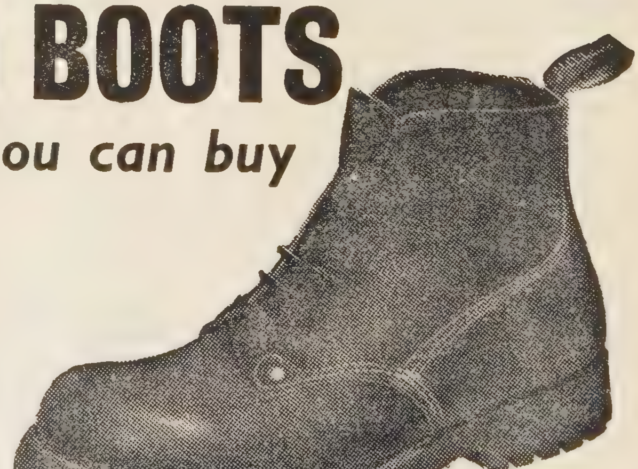
are the best you can buy

Here's why

1. Tough "ENZIDE" soles.
2. Finest grade WADEC leather.
3. Waxed linen thread.
4. 3-deck soles — heavy duty outsole.
5. Solid brass screws.

At leading Shoe shops everywhere.

Distributed throughout New Zealand by BING, HARRIS & CO. LTD.



Made in N.Z.

AI.I

tension line being set alight. Trees should be kept well clear of them and buildings should be sited well away.

Electrical Fires

Electric wiring must be carried out by a qualified electrician. Regulations prohibit amateurs from repairing and installing electrical equipment because of the dangers of electrocution and fire.

A fault in electrical appliances is often indicated by a strong smell of burning, in motors, for example, by a smell of burning shellac.

Electrical appliances should be switched off when not in use. Motors on refrigerators and automatic pumps, however, can be protected with a thermal cut-out switch that operates if the motor should become overloaded. This safety device should be fitted in country districts where the voltage occasionally becomes low, thus causing an overload.

Electric wiring can short-circuit to cause a fire. In an old house perished insulation may result in bare wire, so it pays to have the wiring checked and renewed if suspect. Rats and mice may interfere with wires and the switchboard, and it is wise to turn off the power at the switchboard before the house is left unoccupied.

A fire hazard results where buildings with poor foundations, on swamp land for example, subside and twist and break or damage electric wiring.

Flex used with electric appliances and tools must be kept in good order and discarded when signs of perishing appear. Electric cables should not be placed permanently under mats or through doorways where they are likely to be damaged and create a fire hazard.

Fuses protect electrical circuits from overload which could cause fire. Fuse wire is marked 5 amp., 10 amp., etc., and usually the correct size to be used is marked on the porcelain fuse on the switchboard. When in doubt, consult an electrician. Before a fuse is renewed, the cause of its "blowing" must in any case be determined and remedied.

Faults in incubators and chicken brooders cause many fires. They should be properly designed and constructed of fire-proof materials as far as possible.

Electric Blankets

Electric blankets can start a fire. Investigations recently completed at the University of Canterbury showed elements to be the common fault, but occasionally the trouble originated in the thermostat, or blankets did not have a thermostat. Defective flex and fittings also caused trouble.

The report recommended waterproof elements with a maximum of 5 watts per square foot of blanket and a reliable thermostat.

Electric blankets should be checked at least once a year by a qualified electrician. If they are faulty, repairs should be done by a qualified tradesman. Badly repaired blankets have caused a number of fires.

Misuse caused a third of the fires started by blankets. They should never be doubled over, creased, or placed between mattresses. If they are placed on top of the sleeper, they are inclined to slide off and become creased, so they are best placed on top of the mattress but protected by a rubber sheet if the element is not waterproofed. Fires have started after a cup of tea has been overturned on to an electric blanket.

Electric blankets are designed to warm the bed before it is occupied. If the blanket is switched off once the bed is warmed, the sleeper will be just as comfortable and there will be no risk of fire during the night.

Cigarettes and Matches

Negligence of smokers has probably caused far more fires than records show.

"No Smoking" notices should be placed prominently near petrol and fuel stores in particular.

Smoking can be dangerous close to inflammable household liquids such as dry-cleaning fluid, and some celluloid toys, films, toilet sets, clothing, and curtain materials can be easily set alight.

Smoking in bed has caused many fires through the smoker falling asleep with the cigarette unfinished.

Children

Keep matches away from youngsters, and as soon as they are old enough, educate them to the potential dangers of fire and of smoking experiments with cigarettes or pine needles in a shed, barn, or plantation that is easily set alight.

Rubbish Fires

Garden rubbish is best burnt in an incinerator of stone, bricks, or concrete. Even an old fuel drum gives some control. If burning in the open is necessary, avoid windy days, and keep well away from buildings, hedges, and trees. The area around the incinerator should be cleared of all growth.

Because sparks from a rubbish fire may be carried by a breeze, a hose or other fire-fighting equipment should be kept handy.

Burning-off

Because houses, buildings, fences, stock, and human lives may be endangered if tussock, gorse, and scrub fires are lit carelessly, and get out of hand, the following precautions should be observed:

- Permission to burn should be secured from the local fire authority
- Neighbours and the fire authority should be notified, and arrangements made for rapid communication if the need should arise.
- Wait for settled weather.
- Back burn fire breaks first, and divide the area into manageable sections, using natural fire breaks.
- Arrange for adequate manpower and equipment.

There have been expensive court cases to assess damage caused by uncontrolled burning off.

Fireplaces, Stoves, and Chimneys

Fires may start around stoves and space heaters if they are incorrectly installed. The directions for installations should be carefully followed. The minimum spacing between chimneys and combustible material is laid down in N.Z. Standard Code of Building By-laws, Part 12. In most cases a solid concrete base is specified.

Open fireplaces may be the cause of fire through flying sparks or logs rolling off into the room. The spark guard should be put in front of a fireplace left unattended, and care should be taken to see that logs are firmly placed on the fire.

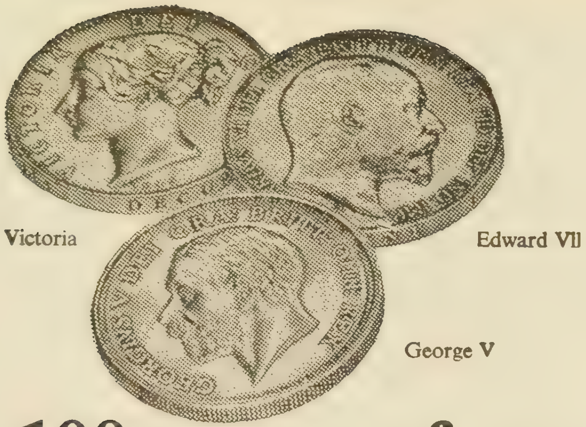
A spark in inflammable clothing drying in front of a fire can start a serious blaze. Children have been seriously injured through clothing catching fire. Dressing in front of an unguarded fire can be dangerous for this reason. Care should also be taken with animals sleeping on the hearth and they should not be left without the guard being placed in position, because of the danger of a spark setting the coat alight.

Burning fat can cause ovens or stoves to burst into flames, the fire often spreading to curtains, paintwork, and the house. The stove should always be checked before the cook leaves the kitchen.

Chimneys should be cleaned regularly at least once a year, as burning soot and sparks from them can start fires in hay or other valuable crops and anything combustible within reach. Fire may weaken a chimney, especially an old one, creating a fire hazard in the house itself.

Never use petrol to start a fire. The flare-up or explosion can cause serious burns, especially if clothing catches fire. Hot ashes from the fireplace carelessly dumped outside can set fire to grass, hedges, and even buildings. They should be placed in a safe ash-can or buried.

In the washhouse wood, paper, and fuel for the copper commonly catch fire. Make sure there is a door on the fire-box, and stack fuel neatly in a box at a safe distance from the copper.



Centennial Year
1861
1961
BNZ

Since 1861 the BNZ has been serving New Zealand farmers. Founded to help the early settlers in even the remotest parts of the country, it has pursued a policy of service throughout New Zealand. Today, in the Bank's Centennial Year, over 380 branches and agencies provide ready service, and offer unrivalled facilities and a friendly welcome.

100 years of service to New Zealand farmers

1861 *A CENTURY OF PROGRESS* 1961

BANK of NEW ZEALAND

New Zealand's Leading Bank

FC2.1A

George VI
Elizabeth II

SILOTHENE SILAGE COVER

means better silage with practically no waste

Illustrated above is a recently-opened wedge-shaped stack which was covered with **SILOTHENE** Polythene sheeting. In this stack there is no silage wastage — even the top few inches are of good quality.

The average loss in a silage stack is 40%. Use of **SILOTHENE** reduces this to 10% or less.

SILOTHENE covers are made of .005 Gauge Black Polythene, double welded at the seams to make it exceptionally strong and durable.

SILOTHENE guarantees top quality silage by:—

- Eliminating the passage of water through the stack — a problem proved in Ruakura research.
- Excluding the entry of oxygen into poorly compacted stacks. This would otherwise cause a rise in temperature resulting in destruction of the lactic acid necessary for the curing process.
- Giving absolute control of biting fly.

SILOTHENE covers are easily kept in position. Simply use the toe of the stack, old hay or sawdust to a depth of 6 inches.

Available from all stock and station agents, dairy companies or your usual farm supplier.

Distributed by **ARTHUR YATES AND CO. LTD.**

Auckland, Christchurch, Palmerston North, Wellington, Whangarei.

E.1.

Selenium Treatment of Animal Diseases and Unthriftiness

THAT selenium-responsive diseases are widespread throughout the Dominion and are of considerable economic importance has been revealed by continued intensive investigations by workers at the Department of Agriculture's Wallaceville Animal Research Station. Farmers at the Ruakura Farmers' Conference in June were brought up to date with recent investigations described in a paper by W. J. HARTLEY, Pathologist at Wallaceville, who emphasised that because food and drug regulations in many countries prohibit residues of selenium in foodstuffs, trials had been directed toward finding the least amount of selenium needed to prevent and control the diseases and unthriftiness he described. An adaptation of his paper follows.

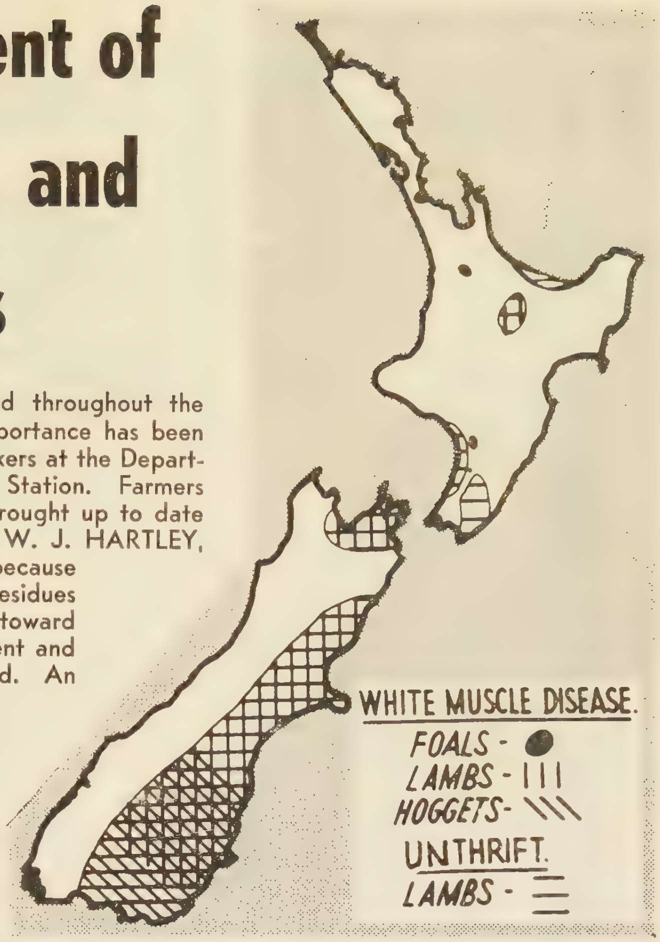


Fig. 1.

UNDER carefully controlled conditions we have been able to demonstrate that selenium administration can prevent:

(a) Congenital white muscle disease in lambs.
(b) Delayed white muscle disease in lambs.
(c) A barren ewe problem associated with (a).
(d) Some forms of unthriftiness in lambs and calves.
(e) Exudative diathesis in chicks.

A brief description of our more recent investigations follows.

Congenital White Muscle Disease and Associated Barren Ewe Problem

In some areas experiencing white muscle disease (W.M.D.) in lambs, particularly the congenital form, there is in some seasons an associated barren ewe problem. Table 1 analyses the incidence of barren ewes in 1958 on 37 South Island properties which had experienced congenital and/or delayed W.M.D. in lambs the previous year. Of the 21 properties experiencing W.M.D. again in 1958, almost half had a barren ewe incidence of over 30 per cent.

On most affected properties the ewes are in good condition at mating and the exact cause of the barrenness is not known; ewes are served and apparently conceive, but do not produce a lamb at term. Ewes barren one year and treated with selenium the next have produced close to 100 per cent of lambs.

In 1959 controlled selenium trials were carried out on 11 properties which for several years previously had abnormally low lambing percentages. White muscle disease had occurred in lambs on all properties, and on at least three there were a severe form of selenium responsive unthriftiness and mortality in lambs.

On these farms half of the trial ewes (from 100 to 500) were given 5 mg of selenium as sodium selenite by mouth at monthly intervals from one month before mating until just before lambing. The control ewes were separated from the dosed ones at lambing. All dead lambs in both groups were subjected to a detailed post-mortem examination, particularly for the presence of W.M.D.

The results in Table 2 of the three trials on North Island pumice soils show that selenium greatly increased the lambing percentage, largely owing to a reduction in the number of barren ewes, and that selenium completely prevented the development of congenital W.M.D. (No delayed type occurred in these trials.)

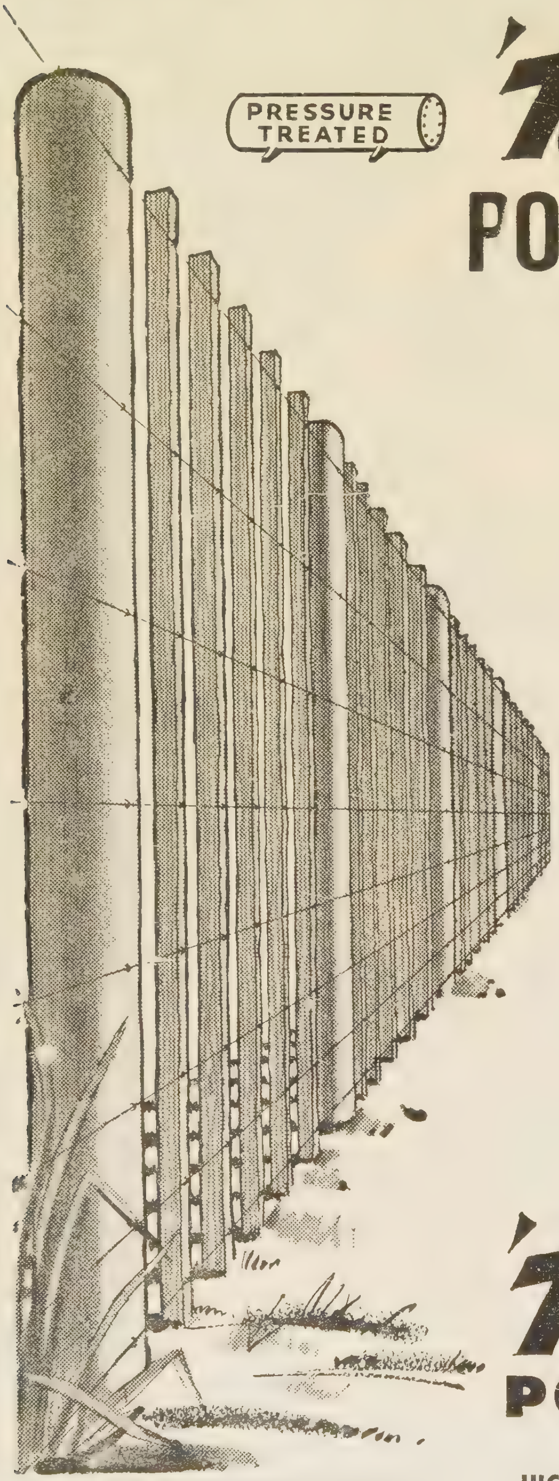
TABLE 1—EMPTY EWE INCIDENCE AND CONGENITAL WHITE MUSCLE DISEASE

Congenital W.M.D.	Number of properties	Empty ewe Incidence (per cent) Under 10	10-30	Over 30
Present	21	3	8	10
Absent	16	12	4	—

TABLE 2—LAMBING DATA FROM THREE TRIAL FARMS IN THE ROTORUA-TAUPO AREA

Owner	Lambing (per cent)		Empty ewe (per cent)		W.M.D. (per cent)	
	Control	Selenium	Control	Selenium	Control	Selenium
Evans	70.5	93.6	26.1	6.4	12.2	—
Carrington	60.6	94.9	31.1	7.5	37.5	
Dick	53.8	92.5	N.A.	N.A.	22.2	—

fence for time with . . .



'Tanalised'*
POSTS and BATTENS

Permanence with full protection against borer, termites, decay and soft rot.

Durability proven by service records extending over 20 years in many countries.

Guarantee of performance lies in the reputation of the world-wide Hickson organisation.

Approved and accepted by Government Departments and Local Bodies and thousands of satisfied farmers.

Lowest annual cost permanent fence you can erect.

Harmless to stock and vegetation.

Clean to handle and non-oily.

Staples remain tightly gripped. Non abrasive to wire.

Light weight with astounding strength makes them ideal for aerial dropping.

Available now at your stock and station agent.

WHAT YOUR MONEY BUYS IN A 'TANALISED'* POST

(1) The most highly fixed multi-salt preservative used in N.Z.

(2) The highest toxicity per cubic foot of wood.

(3) Protection against soft rot attack at ground line and post tops.

(4) A multi-salt preservative which has unrivalled performance in service in clay, sand, swamp or hillside.

(5) Deepest possible preservative penetration.

DON'T ASK FOR "TREATED" POSTS

DEMAND AND USE ONLY GENUINE

'Tanalised'*
POSTS and BATTENS

Full Technical Information available from:

HICKSONS TIMBER IMPREGNATION CO. (N.Z.) LTD.
P.O. BOX 3762, AUCKLAND. TELEPHONE 41-915

*'TANALISED' REGISTERED TRADEMARK

We welcome your enquiries if you doubt whether you have bought genuine 'Tanalised'* Timber.

H35/60

Similar though less spectacular results were obtained for the eight trials on the South Island farms.

Practicable Method of Dosing

As monthly administration of selenium is impracticable under New Zealand farming conditions, more detailed investigations were carried out in 1960 to ascertain a more practicable and yet still effective method of selenium dosing.

Trials were made on two large State-owned blocks of pumice country in the Rotorua-Taupo area. These properties were being developed from virgin scrub and for the past two years had had lambing percentages of about 40 per cent, and both also had a selenium-responsive unthriftiness in lambs. On each property the ewes were divided into six even groups of 200 and subjected to the following treatments:

Group 1: 5 mg of selenium by mouth monthly from one month before the beginning of mating until just before lambing.

Group 2: 5 mg of selenium one month before mating, repeated two months later and one month before lambing.

Group 3: 5 mg of selenium once only one month before mating.

Group 4: 25 mg of selenium three times as in Group 2.

Group 5: 25 mg of selenium once as in Group 3.

Group 6: Controls (untreated).

The 1,200 ewes were mated and run together until just before lambing, when they were divided into their respective groups and lambed separately.

Table 3 gives the results from one of the trials. All selenium treatments substantially increased the lambing percentages and there was no significant difference between treatments. Though the incidence of congenital W.M.D. was very low, it was shown that 5 mg of selenium given once was insufficient to prevent it. On the second property the selenium-treated groups gave only a slightly increased lambing percentage, indicating that something more than selenium deficiency was affecting them.

In all the ewe fertility trials described the ewes started in average to good condition. However, at lambing the dosed ewes appeared to be more thrifty, produced more milk, and had heavier and livelier lambs than did the controls. Further, ewes dosed with selenium produced up to 2 lb (20 per cent) more wool.

TABLE 3—EFFECT OF SELENIUM ON EWE FERTILITY AT TAUPO
(200 EWES PER GROUP)

Treatment	Lambing percentage at docking	Congenital W.M.D. incidence per cent	Barren ewe incidence per cent
5 mg selenium monthly	116	—	4
5 mg selenium three times	112	—	2.5
5 mg selenium once	118	12	5
25 mg selenium three times	108	—	3
25 mg selenium once	117	—	3
Control	74	16	30

Suggested Preventive and Curative Treatments for Selenium-responsive Diseases of New Zealand Livestock

THESE suggestions are largely based on controlled trials in affected areas. They are not necessarily general recommendations for all seasons for all soils. Subsequent investigations may necessitate their modification.

As such minute amounts of selenium are required by the animal, individual dosing appears to be the most logical method of selenium administration and at the moment is the only one that can be recommended.

In our opinion selenium should **not** be incorporated with artificial fertilisers, feedstuffs, or licks at this stage. Such methods of administration would undoubtedly supply more selenium than the animal needs.

SHEEP

Barren Ewe Problems and Congenital White Muscle Disease

5 mg of selenium by mouth to ewes one month before mating, repeated one month before lambing.

Congenital and Delayed White Muscle Disease

5 mg to ewes one month before lambing.

1 mg to lambs at tailing.

In outbreaks of delayed W.M.D. 5 mg by mouth at the same time as or combined with 250 mg of alpha-tocopheryl acetate.

Selenium-responsive Unthriftiness in Lambs

1 mg at tailing; 5 mg repeated at two- to three-monthly intervals or each time the lambs are yarded.

In outbreaks of S.R.U. an initial dose of 5 mg, repeated as necessary.

Selenium is not the answer to all forms of unthriftiness in lambs.

It does not have any beneficial effect on the autumn flush ill-thrift which is so common in some seasons in the North Island.

CATTLE

Selenium Responsive Unthriftiness

For dairy calves: 10 mg subcutaneously at three months, repeated three monthly or as necessary.

For beef calves: the same dose at marking and at weaning, repeated as necessary.

Yearlings and adults: 20 mg subcutaneously as required. In outbreaks of S.R.U. 20 to 30 mg can be given subcutaneously as an initial dose and repeated as necessary.

POULTRY

Exudative Diathesis (E.D.)

At one week of age. 10 mg per gallon of drinking water for one day, repeated at one month.

In outbreaks of E.D. 15 mg per gallon of drinking water, repeated if necessary in one month. Wheat germ meal or alpha-tocopherol may also be given.

PIGS

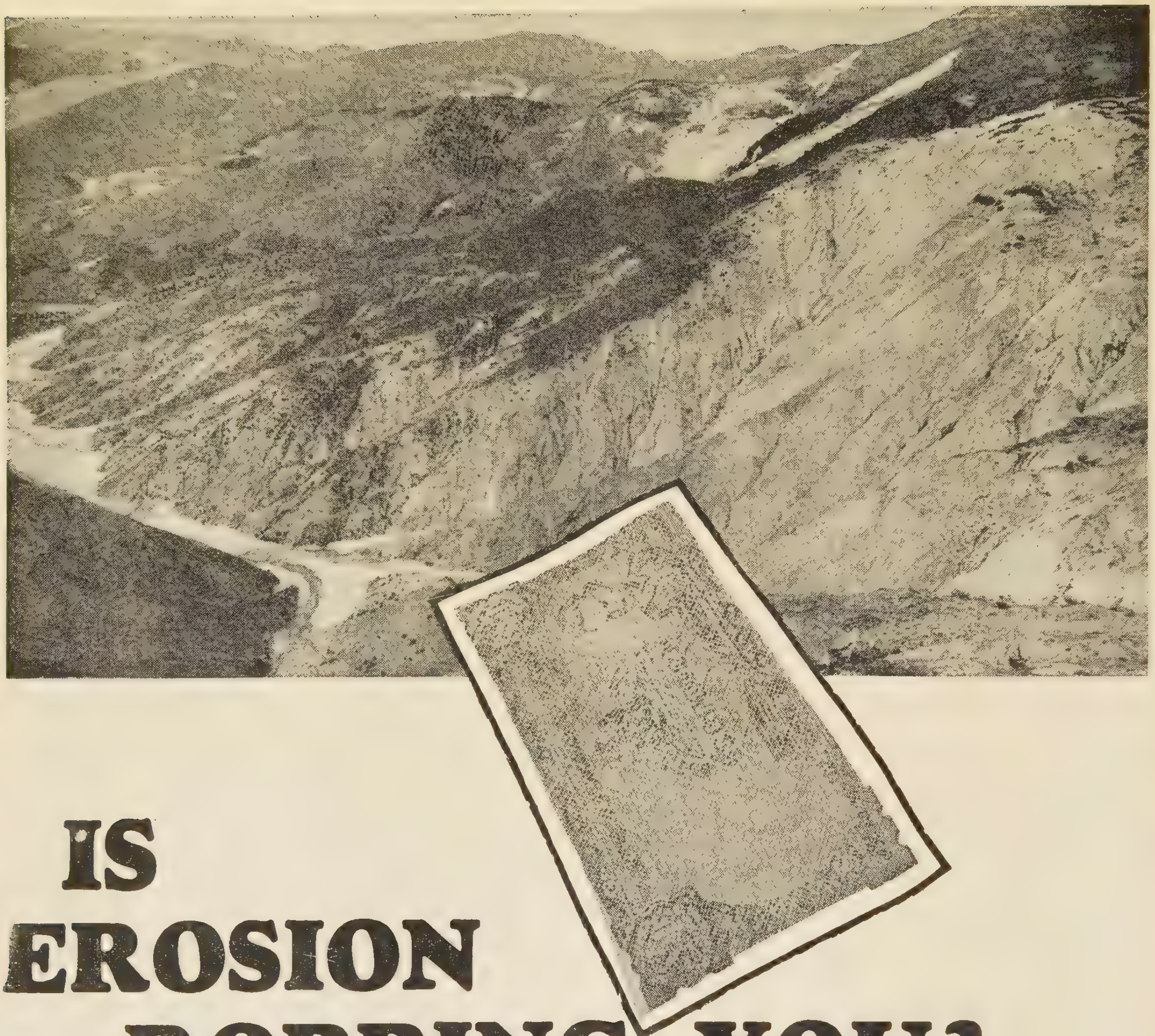
Hepatosis Diaetetica

This condition has been shown to be preventable by selenium administration in Scandinavia, but no controlled trials have been carried out in New Zealand. A suggested preventive treatment on affected properties is 2 mg to piglets at four weeks with 5 mg at weaning, repeated at three months.

Selenium-responsive Unthriftiness in Livestock

Sheep

Failure to thrive is probably the most important cause of wastage in the



IS EROSION ROBBING YOU?

It is robbing this nation and yet any farmer with average equipment can help to hold the soil and build himself a better living through conservation farming. It's proved! Work, such as carried out on Soil Conservation Reserves, shows that land can be brought back into full profit. Through catchment boards and Government departments, the Soil Conservation and Rivers Control Council has made available many *effective* conservation methods. The advice is free and subsidy is available for erosion control. On request a catchment board or the Department of Agriculture will assess the land capability of your property and prepare a conservation farming programme, geared to your own resources for a five-year period.

In an economy dependent on primary production
SOIL CONSERVATION IS VITAL

Soil Conservation and Rivers Control Council

7749

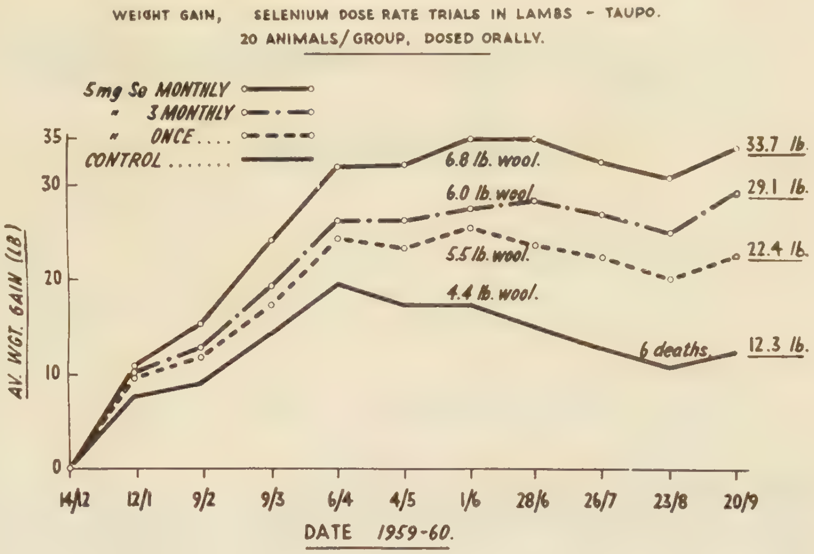


Fig. 2.

New Zealand sheep industry. Though some of the unthriftiness is directly associated with under feeding, most of it occurs in young stock grazing on abundant apparently good pasture.

Known causes of unthriftiness are cobalt deficiency and internal parasites. However, it is commonly accepted that these account for only a small part of the unthriftiness. A further type of unthriftiness termed autumn-flush hogget ill thrift is seen in the North Island on pastures stimulated by warm early autumn rains.

Accumulating information suggests that much of the previously unclassified unthriftiness in lambs, other than the autumn-flush hogget ill thrift, responds to selenium administration.

Selenium-responsive unthriftiness (S.R.U.) typically occurs on improved farms on light, readily leached types of soil (stones, silt, sand, and pumice), and rarely on the heavier soils. Fig. 1, outlining the main areas involved, shows that S.R.U. occurs in both lamb W.M.D. areas and in areas where W.M.D. has not been recognised.

Though S.R.U. is largely confined to lambs and hoggets, in some areas and in some seasons adult stock are also involved. On affected country lambs may thrive until two or three months of age; they then stop growing, lose weight, become dejected, stop eating, and die. The wool of affected lambs loses its character and some sheep develop diarrhoea. Deaths from S.R.U. continue throughout summer and autumn, but usually cease by mid winter.

Lambs with S.R.U. show advanced emaciation and soft, brittle bones on post-mortem examination. In some cases the remaining fat is yellow and many lambs carry a very high gastro-intestinal worm burden. Affected lambs produce less wool (up to 30 per cent) of poorer quality than do selenium-dosed ones.

When W.M.D. and S.R.U. occur on the one property in the one season the unthriftiness usually does not become apparent for several weeks and sometimes months after the muscle disease.

Selenium has had a dramatic effect in controlling lamb unthriftiness and mortality on the pumice soils in the centre of the North Island. Altogether in the 1958-59 season 33 controlled trials were carried out on unthrifty weaned lambs in the central and southern part of the North Island, and in 22 of these a statistically significant weight gain was obtained in the selenium-dosed groups. In these trials 5 mg of selenium as selenate or selenite was given monthly by mouth.

During the 1959-60 summer the Department of Agriculture organised a Dominion-wide survey to ascertain the distribution of S.R.U. in lambs[*]. Two hundred and seventy-four trials, approximately equally divided between both Islands, were carried out mostly on unthrifty weaned lambs on all classes of soils. The results of this survey show that there was a statistically significant response to selenium on 43 per cent of the South Island properties and 14 per cent of the North Island ones (Fig. 1).

Most of the responses to selenium occurred on light soils, a few on the heavier soils, but none on peat. This survey was repeated last summer.

Recent and current selenium trials have been designed primarily to ascertain an effective, safe, and at the same time convenient method of selenium administration. Up to the present all our trial work has been concerned with individual dosing of selenium either orally or subcutaneously. Application of selenium to pasture will be investigated experimentally next season.

One detailed series of trials has been carried out on the North Island pumice soils (where there is a barren ewe problem, W.M.D., and serious S.R.U. in lambs) and the other on the North Island coastal sand (where there is no barren ewe problem and no W.M.D., but serious S.R.U. in lambs).

Results on Pumice Country

The trials on pumice country have shown that:

1. Lambs born from selenium-dosed ewes grew faster than those born from undosed ewes.
2. Lambs born from selenium-dosed ewes and themselves dosed at tailing (two to three weeks) grew faster than those similarly treated but born from undosed ewes.
3. Lambs responded equally to monthly doses of 1.25, 2.5, and 5 mg of selenium given either orally or subcutaneously.
4. Monthly dosing gave slightly better growth rates than three monthly dosing (Fig. 2).
5. Ten mg and 20 mg of selenium given monthly by mouth had an apparent slight toxic effect as evidenced by decreasing growth response.

Results on Sand Country

The trials on sand country have shown that:

1. Lambs responded only slightly to oral selenium from tailing (30/8/60) to 27/10/60. However, during November and December, the period

TABLE 4—EFFECT OF SELENIUM ON LAMB UNTHRIFTINESS, 1960-61

	Selenium treatments Docking 30 August	 Weaning 25 November	 Shearing 17 February	Average total weight gain 30 August to 17 March	Mortality from unthrift 25 November to 17 March
				lb	per cent
1	5 mg monthly from 30 August			42.2	—
2	5 mg	5 mg	5 mg	44.4	—
3	1 mg	1 mg	1 mg	40.6	—
4	—	5 mg	5 mg	40.1	—
5	—	5 mg	—	38.7	—
6	—	1 mg	1 mg	35.5	5
7	—	—	—	33.0	40

---

[*] See "Liveweight Responses to Selenium in Lambs", page 306, October issue.

Control Pasture Weeds

Improve your pastures, increase your profits, by spraying with YATES Hormones and chemicals . . .

Spray now with Yates Weed-killing Hormones and Chemicals and ensure your farm gives maximum yield per acre. Improved pasture means increased production.

Be certain of your results — Overseas and New Zealand Technicians working together have produced Yates weed-killing Hormones and Chemicals.

Yates

HORMONES

AND AGRICULTURAL CHEMICALS.

J.1

For advice on application and other technical information contact your local Yates Distributor.

Distributed by **ARTHUR YATES & CO. LTD.**

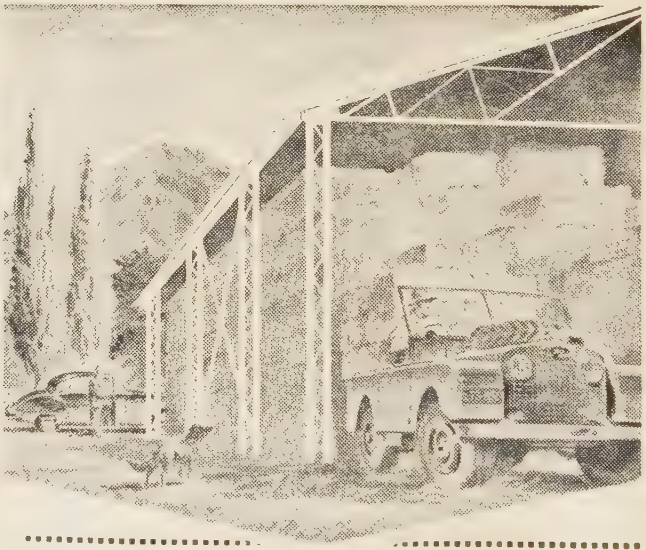
AUCKLAND • CHRISTCHURCH • PALMERSTON NORTH • WELLINGTON • WHANGAREI

Cyclone

GALVANISED FARM BUILDINGS

STRENGTH, endurance, tested by time. Trusted products, developed by structural specialists, satisfied only with the best . . . built by skilled craftsmen. No wonder all Cyclone products are in such constant demand. When you need permanent gates, fences, tubular steel buildings, sheep and cattle yards, contact your nearest **CYCLONE** stockist or write to one of the addresses below for full information on the farm building or the Cyclone Product in which you are interested.

Cyclone



POST THIS COUPON TODAY!

To Cyclone: Auckland, Hastings, Christchurch,
Timaru, Dunedin, Invercargill.

Please supply me with details of Cyclone Products

PRODUCT ....

NAME ....

ADDRESS ....

My usual Merchant is CY.18

of maximum pasture growth, there was a marked response.

2. Five mg of selenium given orally at tailing (30/8/60) and repeated at weaning (25/11/60) and shearing (17/2/61) resulted in a weight gain, up to 17/3/61, identical to that obtained from 5 mg of selenium given orally at monthly intervals from tailing and slightly better than that obtained from 1 mg of selenium given orally at tailing, weaning, and shearing (Table 4).
3. There was no difference in growth response to dose levels of selenium between 0.63 and 5 mg when given by mouth at 14-day intervals, and no difference between 5 mg monthly and 5 mg fortnightly. One oral dose of 10 mg of selenium produced a satisfactory growth response for 18 weeks (Fig. 3).

Cattle

Unthriftiness in cattle is widespread in the North Island, but is not such an important cause of wastage as it is in sheep. Cobalt and copper deficiency and parasitism apparently play only a limited part in causing the problem.

Selenium-responsive unthriftiness is seen in some seasons, particularly in those associated with lush growth, in dairy calves on the coastal sandy soils and stony soils of the south of the North Island and in beef and dairy calves on the central pumice soils. Affected animals show a severe and rapidly progressive form of unthriftiness which is usually associated with a profuse diarrhoea. This condition occurs mainly in autumn and winter, and on some farms may be associated with heavy mortality. Similar outbreaks occur occasionally in adult cattle.

Initial field trials have shown that dairy and beef calves on pumice soil respond to selenium administration (Fig. 4). These trials have been extended to find the smallest dose given at the longest interval which is necessary to produce a satisfactory weight gain. Preliminary results from our current trials suggest that a subcutaneous injection of 20 mg of selenium given every four months may be sufficient.

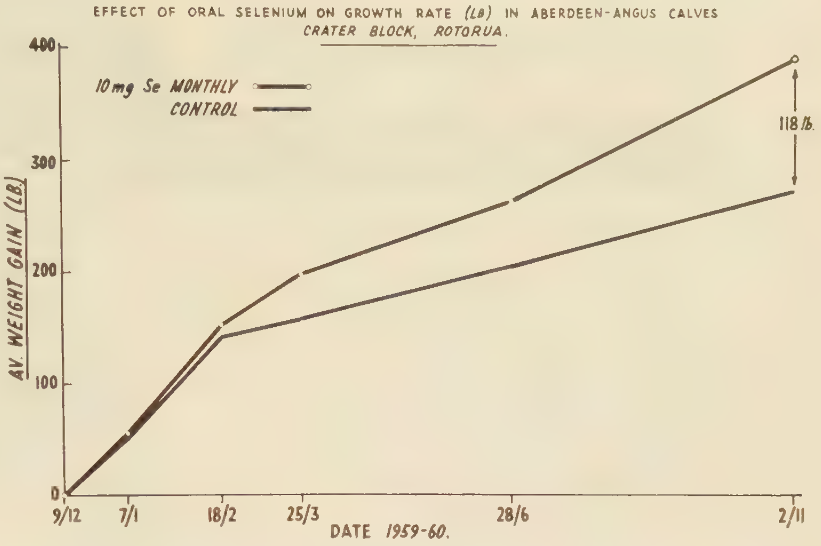


Fig. 4.

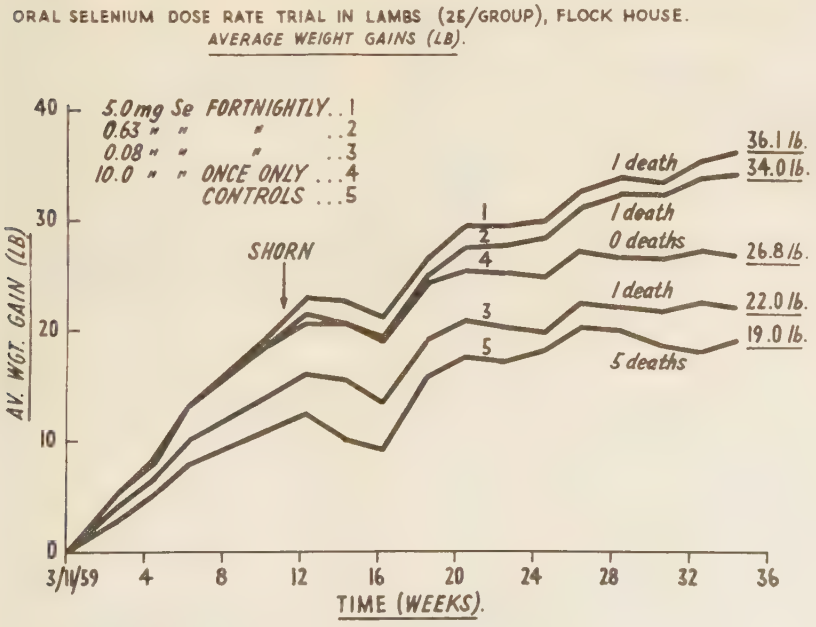


Fig. 3.

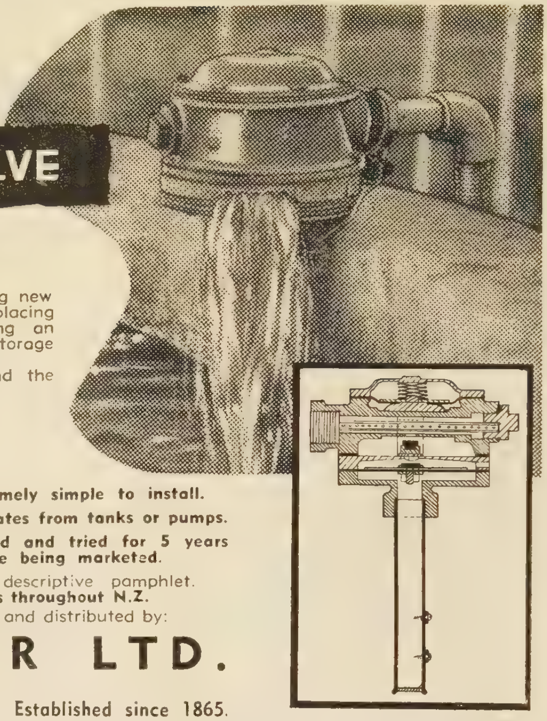
Hepatosis Dietetica in Pigs

During the last three years hepatosis dietetica has been recognised in at least 25 piggeries throughout both Islands. Most, but not all, outbreaks have occurred in areas where selenium-responsive diseases are seen in sheep and most have occurred from May to October. On most affected properties the diet consisted of either whey or skim milk supplemented with barley meal and usually included cod liver oil, sometimes in liberal amounts.

Outbreaks have been seen in piglets from six to 14 weeks old, usually either just before weaning or shortly after transference to fattening pens. Losses have varied considerably; in some instances up to 50 per cent of susceptible litters have succumbed. In two big piggeries the losses continued over several months. Several outbreaks have been complicated by salmonellosis.

Clinical signs are seldom seen, animals usually being found dead. Affected pigs seen alive are lethargic, rapidly become prostrate, and their breathing is laboured. In one outbreak affected animals showed stiffness, trembling, and ataxia. The post-mortem findings are quite characteristic and consist of large amounts of fluid and fibrin in body cavities, with an enlarged, friable, finely mottled liver, and often multiple minute white flecks in the heart musculature.

No controlled field trials have been carried out. However, except where salmonellosis has been a complicating factor, losses have ceased a few days after the feeding of cod liver oil has been stopped and the piglets have been given 5 mg of selenium orally. Losses



The Revolutionary NEW 'WYLIE' WATER VALVE

PROVES ITS WORTH ON EVERY FARM!
N.Z. Patent No. 107071.

What is the new "Wylie" valve? . . . It is an amazing new invention, so simple in operation, which today is replacing antiquated and inefficient, ballcocks and is winning an unprecedented reputation for the control of water storage for cattle and sheep troughs throughout the country.
Fit "Wylie" valves on all your watering points round the farm . . . and forget them!

- **No floating parts for stock to damage, hence no danger of overflowing.**
- **Operates automatically by atmospheric pressure.**
- **Suitable for water pressures—20 lbs. to 150 lbs. per square inch.**
- **Low cost—saves wastage—needs no maintenance.**
- **Extremely simple to install.**
- **Operates from tanks or pumps.**
- **Tested and tried for 5 years before being marketed.**

Ask for a demonstration today, or write for descriptive pamphlet.
Readily available from Stock and Station Agents throughout N.Z.
Manufactured to the highest standards of quality and distributed by:

F. & W. FOWLER LTD.
Founders and Engineers
112 Albert Street, AUCKLAND, C.1. Telephone 20-863. Established since 1865.

FWF2/1

Dose LAMBS on the MOTHER ...and watch them fatten faster, with...

Monekil 'S'

By dosing suckling lambs on the mother with MONEKIL "S", you can protect them against stomach and tapeworms that may be picked up before weaning. Lambs without worms fatten faster—therefore it *must* be beneficial to dose with MONEKIL "S" and remove stomach and tapeworms as early as possible!
MONEKIL "S" is 100% effective against tapeworms, and owing to its formulation *there is no danger of costly wool staining.* The small MONEKIL "S" tablet fits the ordinary dosing gun, and is entirely SAFE with lambs over six weeks old.
PULPY KIDNEY—Tapeworms share sheeps' food and damage intestinal tissues. They are suspected of increasing the incidence of PULPY KIDNEY by delaying the passage of food through the intestines. Dosing your sheep and lambs with MONEKIL "S" definitely kills tapeworms—reduces chances of PULPY KIDNEY infection.

CROWN BRAND
CROWN STOCK REMEDIES
Monekil 'S'
A Registered Stock Remedy.

For the control of Parasitic Gastritis and Tapeworms in sheep and lambs.

Stockists throughout New Zealand. Ask your Stock and Station Agents, or apply to:—

MACDERMOTT and DUNCAN LIMITED,
29 Hunter Street, Wellington.

9.30

have also been controlled by selenium administration when no cod liver oil was being fed.

Paradental Disease of Sheep

Paradental disease is an important cause of unthriftiness and losses in some areas of New Zealand and is apparently associated with proven selenium-responsive diseases.

A limited survey of farms where paradental disease had been a serious problem was recently carried out. On most of them it was found that S.R.U. or W.M.D. in lambs or ewe infertility had also occurred; and that on the properties where selenium had been given to the ewes the disease had virtually disappeared.

Long-term trials are in progress to ascertain if selenium will protect ewes from paradental disease.

Laboratory Investigations

For the past two years workers at Wallaceville have been trying to perfect a suitable method for detecting minute amounts of selenium in pasture and animal organs. By modifying existing procedures Dr A. B. Grant has now developed a most efficient method and he is now examining a tremendous backlog of samples.

It will be several months, however, before we will be able to say whether or not there is a deficiency of selenium in the pasture which selenium-responsive animals are consuming. Further it will be at least a year before we will be able to give a routine diagnostic test for selenium.

Benefits but Care Needed

We have recognised in New Zealand all the recorded selenium-responsive diseases of livestock; in addition we have observed several that have not been described elsewhere.

The investigations reported in this article indicate that selenium-responsive diseases are widespread throughout the Dominion and that they are of considerable economic importance, particularly to the sheep industry.

To maintain its economy New Zealand must produce increasing quantities of animal products for export. Selenium in a small way is helping to do this. But it is of great importance that the commodities which we export are acceptable on the world market. As the food and drug regulations in many countries stipulate that foodstuffs shall contain no selenium. our immediate investigations are concerned with ascertaining the lowest amount of selenium required to prevent and control the diseases described. By doing this and also by controlling the sale of selenium, we should be able to restrict the selenium content of animal tissues to close to the physiological normal.

Agricultural and Pastoral Show Dates

THE following are dates and venues of A. and P. shows up to the end of April 1962:

NORTH ISLAND

November

*17 and 18 November—Egmont A. and P. at Hawera.

18 November—Waihi A. and P. at Waihi.

18 November—Bay of Islands P. and I. at Waimate North.

*23, 24, and 25 November—Auckland A. and P. at Epsom, Auckland (Royal Show).

24 and 25 November—Stratford A. and P. at Stratford.

29 November—Plains A. and P. at Ngatea.

December

1 and 2 December —Taranaki A. and P. at New Plymouth.

1 and 2 December -Kaikohe A. P. and H. at Kaikohe.

*2 December Helensville A. and P. at Helensville.

*9 December—Whangaroa A. and P. at Kaeo.

January

1 January—Nuhaka A. and P. at Nuhaka.

13 January—Waipu A. and P. at Waipu.

19 and 20 January —Wairoa County A. and P. at Wairoa.

*19 and 20 January—Feilding I. A. and P. at Feilding.

26 and 27 January—Horowhenua A. and P. at Levin.

*27 January—North Kaipara A. and P. at Paparoa.

31 January—Marton District A. and P. at Marton.

February

2 and 3 February—Rodney A. and P. at Warkworth.

3 February—Rangitikei A. and P. at Taihape.

*3 February—Katikati A. and P. at Katikati.

3 February—Woodville A. and P. at Woodville.

6 and 7 February—Dannevirke District A. and P. at Dannevirke.

*10 February—Pahiatua A. and P. at Pahiatua.

9 and 10 February—Taumarunui District A. and P. at Taumarunui.

10 February—Hukerenui A. and P. at Hukerenui.

14 February—Te Awamutu A. P. and H. at Te Awamutu.

16 and 17 February—Ohura A. P. and H. and I. at Niho Niho.

16 and 17 February—Franklin A. and P. at Pukekohe.

16 and 17 February—Masterton A. and P. at Masterton (75th Jubilee).

*17 February—Waiapu P. and I. at Ruatoria.

17 February—Opotiki A. and P. at Opotiki.

19 February—Northern Wairoa A. and P. at Mititai.

20 February—Otorohanga A. and P. at Otorohanga.

21 February—Te Kauwhata A. and P. at Te Kauwhata.

23 and 24 February—Te Kuiti A. and P. at Te Kuiti.

23 and 24 February—Wellington and Hutt Valley A. and P. at Trentham.

*23 and 24 February—Mangonui County A. and P. at Kaitaia (75th Jubilee).

24 February—Waimarino A. and P. at Raetihi.

24 February—Te Puke A. and P. at Te Puke.

24 February—Putaruru District A. and P. at Putaruru.

March

1 March—Morrinsville A. and P. at Morrinsville.

*3 March—Matamata A. and P. at Matamata.

3 March—Whakatane A. and P. at Whakatane.

5 March—Waiotira Junction at Waiotira.

10 March -Kumeu A. and H. at Kumeu.

17 March—Wellsford A. and P. at Wellsford.

SOUTH ISLAND

November

*17 and 18 November—Nelson A. and P. at Nelson.

18 November—Waimate A. and P. at Waimate.

18 November—West Otago A. and P. at Kelso.

18 November—Courtenay A. and P. at Kirwee.

18 November—Taieri A. and P. at Outram.

22 November—Winton A. and P. at Winton.

24 and 25 November—Timaru A. and P. at Timaru.

*25 November—South Otago A. and P. at Balclutha.

28 and 29 November—Gore A. and P. at Gore.

December

2 December—Wyndham A. and P. at Wyndham

2 December—Otago Peninsula A. and P. at Portobello.

*5 and 6 December—Southland A. and P. at Invercargill.

January

13 January—Wallace A. and P. at Otautau

20 January—Waiau A. and P. at Tuatapere

*27 January—Peninsula Horse and A. and P. at Duvauchelle

27 January—Palmerston and Waihemo A. and P. at Palmerston.

30 and 31 January—Otago A. and P. (South Island Championships) at Dunedin.

February

3 February—Golden Bay A. and P. at Takaka

3 February—Whataroa A. and P. at Whataroa

3 February—Banks Peninsula A. and P. at Little River.

10 February—Inangahua A. and P at Reefton

17 February—Murchison A. and P. at Murchison.

17 February—Maniototo A. and P at Ranfurly

23 February—Central Otago A. and P. at Omakau.

24 February—Buller A. and P. at Westport

*24 February—Kaikoura A. and P. at Kaikoura

March

*3 March—Temuka and Geraldine A. and P at Winchester.

3 March—Amuri A. and P. at Rotherham.

3 March—Rai Valley A. and P. at Rai Valley

*10 March—Mayfield A. and P. at Mayfield.

10 March—Mt. Benger A. and P. at Roxburgh

13 March—Lake County A. and P. at Lake Hayes (near Arrowtown).

17 March—Hawarden A. and P. at Hawarden

17 March—Upper Clutha A. and P. at Wanaka

*17 March—Flaxbourne A. and P. at Ward.

31 March—Methven A. and P. at Methven

April

7 April—Oxford A. and P. at Oxford.

14 April—Malvern A. and P. at Sheffield.

23 April—Mackenzie County Highland Show at Fairlie.

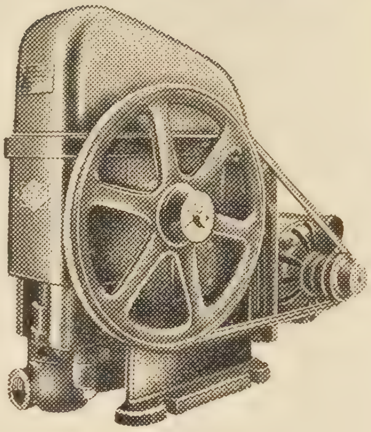
*23 April—Strath Taieri A. and P. at Middlemarch.

* The Department of Agriculture exhibit will be staged at this show.

PRICE'S 5in STROKE

3/4 H.P. DEEPWELL PUMP

WILL DELIVER 400 GALLONS PER HOUR FROM A DEPTH OF 110 FEET OR 100 GALLONS PER HOUR FROM 300 FEET.

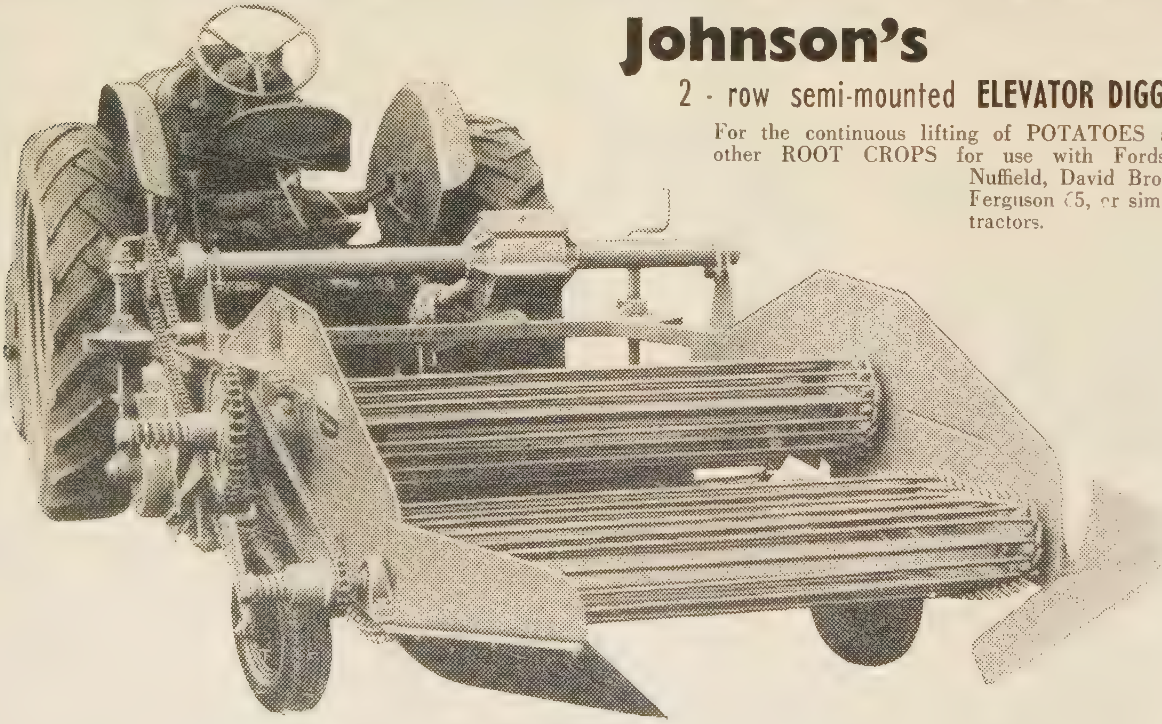


The latest development and design in the famous range of Renown Pumps suitable for well cylinders up to 3in bore and depth up to 300 feet. A simple locating system for the glandless head allows the gearing to be removed easily from the well and reduces installation and maintenance difficulties. This self oiling compact unit requires little attention. Overall dimensions with motor and pulleys — Height 20 inches, Width 13 inches, Length 24 inches, Weight 70 lbs (less motor) Speed 53 strokes/min.

Inquire from your nearest agent or direct to the Manufacturers.

W. H. PRICE & SON LTD.

P.O. Box 1084, Christchurch. Telephone 69-174. Telegrams "Pricebrass."



Johnson's

2 - row semi-mounted ELEVATOR DIGGER

For the continuous lifting of POTATOES and other ROOT CROPS for use with Fordson, Nuffield, David Brown, Ferguson 35, or similar tractors.

Distributors:

Sole North Island
C. H. CAMPBELL LTD.
P.O. BOX 21, BROADWAY,
MARTON.
PHONE 2219

Sole South Island
WASHDYKE IMPLEMENT LTD.
P.O. BOX 169,
TIMARU.

New Sprays for the Home Orchard

By S. FREW,
Instructor in Horticulture,
Department of Agriculture,
Christchurch

A BEWILDERING array of spray materials confronts the home orchardist today. Many are highly toxic and dangerous to handle; others may be used with comparative safety. Some comments on the evolution of these newer types of fungicides and insecticides, with particular reference to those most suitable for home orchard use, are given in this article, which also discusses manures for the home orchard and routine work during summer.

THE aim in the development of these newer spray materials has been to maintain or increase their efficacy with less damaging effect on fruit or foliage.

Though this trend toward more effective but milder sprays may be thought to be a recent innovation, owing to the multiplicity of new materials now offering, it is really a continuance of the constant striving for improved materials which has taken place since spraying first became an accepted fruitgrowing practice.

This can best be appreciated by considering the types of material used by growers in the early days of the 20th century. At that time caustic soda, kerosene, and strong mixtures of lime, salt, and sulphur were the principal ingredients used, but their effect was so harsh that their use was confined practically to the dormant period. Eventually, less stringent materials were introduced, and for many years the standard fungicidal sprays were lime sulphur dilutions, which in turn were largely superseded by milder sulphur sprays. Bordeaux mixture, of course, was used in these earlier days and is still in use.

These older standard types of spray materials were highly satisfactory for disease control, but often they damaged fruit and foliage. The russeting of pip fruit, for example, became an accepted condition, while scorched foliage was common. The accent in recent years, therefore, has been on the development of milder fungicides, and their use has resulted in more clear-skinned fruit and more luxuriant

DORMANT MERCURY
DEADLY POISON
ESTOX
KARATHANE WD
Agricultural Fungicide
DEADLY POISON
DEADLY POISON
HEXONE
ROGOR
Black Leaf 40

Modern insecticides include many highly toxic materials. This group emphasises their general toxicity with the endorsement "Deadly Poison" or "Poison" on each container. Spraying with such materials necessitates wearing protective clothing with a gas mask, eyeshield, and gloves as shown below.

Now available

the NEW triple action weedkiller

VOROX®-SDA

FOR TOTAL VEGETATION CONTROL

SIMAZINE
DOWPON*
AMITROL
are the powerful weedkillers in Triple-action VOROX—SDA

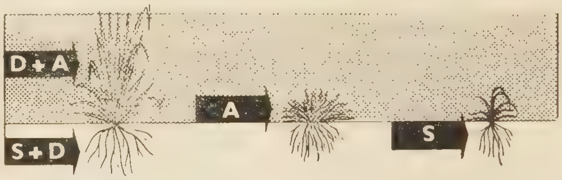
3 proven weedkillers in 1 balanced formula give TOTAL weed control and QUICK knockdown.

S. Simazine kills weeds through the roots and remains in the soil to keep on killing weed seedlings for prolonged periods.

D. Dowpon kills grass weeds through the roots *and* the foliage.

A. Amitrol gives quick knockdown of broad-leafed weeds and grasses.

WEEDS HAVEN'T A CHANCE AGAINST VOROX—SDA TRIPLE-ACTION WEED CONTROL



Safe to use
Harmless to stock
Non-inflammable
Non-corrosive
Non-conductive

The perfect weedkiller for almost every problem —easy to use—highly effective.

Ask your

WEEDONE SERVICE DISTRIBUTOR
about VOROX - SDA

(R) Regd. Trade mark of J. R. Geigy SA Basle and Amchem Products Inc., Ambler Pa.
* Regd. Trade mark of Dow Chemical Company Ltd., U.S.A.

IW.94V

IW **IVON WATKINS LIMITED, NEW PLYMOUTH**

foliage on trees, which consequently grew better and produced heavier crops.

With insecticides progress has been spectacular, not only during recent years, but even since the turn of the century. Sixty years ago orchard insect pests were rampant in New Zealand, and other than the harsh materials used in the dormant season to control scale insects, no sprays were used against the more common orchard pests. In 1900, for example, an Auckland fruitgrower reporting to a growers' conference in Dunedin stated that there was no possible control in his district for codling moth in apples and pears, and that 95 per cent of his crop was infested annually. This attitude was reflected some years later, on the introduction of orchard disease control regulations in New Zealand, when a special dispensation to the Auckland Province permitted growers to market codling moth-infested fruit, as it was considered impossible to control this pest there by spraying.

Lead arsenate sprays eventually overcame this problem, and sprays using this material in combination with a fungicide (either bordeaux mixture or a sulphur-based material) soon became standardised. Lead arsenate is still in common use, particularly in home gardens, but it has been largely superseded in recent years in commercial orchards by DDT and DDD. The use of these materials has introduced the additional problem of insect resistance, which in turn has stimulated the development of further new materials. The objectives with the modern insecticide can be summarised as:

1. To kill or incapacitate a high percentage of one or more stages of the pest, but not to cause any damage to the crop treated.

2. To be economical and easy to apply.

3. To have persistence or lack of persistence according to the time lapse between application and harvesting.

Systemic Sprays

Perhaps the greatest transition in the evolution of modern insecticides has been the introduction of systemic sprays. These materials, most of which unfortunately are highly toxic, are of great value in controlling sucking insects such as aphids, as the material enters the sap stream of plants and thus provides protection from insect infestation even though the spray coverage has not been as complete as was necessary with earlier materials. Systemics, however, depend on the plant being in active growth and show a tendency to spread unevenly within the plant, gravitating toward the region of most active development.

Organo-phosphorus Materials

Organo-phosphorus materials are one of the latest developments in insect control. They vary in toxicity, but unfortunately the majority are too dangerous to use in the home orchard. Not only must protective clothing, gas mask, and gloves be worn by the operator, but the application of these materials may create a hazard to close neighbours in the form of spray drift, and thus they are not suitable for use in urban areas. Accessibility to children is of course another danger, and the lethal properties of most of these elements must be fully recognised at all times. A few exceptions (one example is malathion) are relatively safe to use, however, and these provide some of the best modern insecticides for common use today.

New Sprays for Home Orchard

The following section does not attempt to enumerate all the new spray materials which may be suitable for home garden use, but does specify some of the most promising which the progressive home orchardist may wish to try:

Fungicides

Captan (N-trichloromethylthio-tetrahydrophthalimide): An excellent mild type of fungicide for the control of brown rot on peaches, black spot on apples and pears, and botrytis on strawberries. A few varieties of apples, however, appear to be intolerant to captan and it should not be used on Delicious, Kidd's Orange Red, or Lord Wolseley; otherwise russeting and foliage damage may result. It cannot be used in conjunction with lime-based materials such as lime sulphur or bordeaux mixture, but is compatible with most other sprays. Use at 1 oz to 4 gallons of water.

Copper oxychloride is a good substitute for bordeaux mixture and can be used in all instances in place of bordeaux mixture. It has the added advantage that other materials can be combined with it safely when bordeaux mixture could not be so used. A wettable powder, ready for instant use, it is far less trouble to prepare than the standard bordeaux mixture. Use at 3½ oz to 4 gallons of water.

Thiram (tetramethyl thiuram disulphide) is a mild fungicide, compatible with all sprays except alkaline compounds. It gives good control of black spot of apples, brown rot of stone fruit, and botrytis in strawberries. Use at 1 oz to 4 gallons of water.

Phygon (dichloronaphthoquinone) is useful for control of brown rot in stone fruit at the blossom stage. It may damage fruit if applied later and its use should therefore be confined to the earlier sprays. Use at ½ oz to 4 gallons of water.

Granulated forms of "complete" manures are clean to handle and easy to spread. They have the added advantage of being in a readily soluble form.

Ferbam (ferric dimethyldithiocarbamate) is a mild fungicide for the control of black spot on apples. It should not be used within seven days of harvest, or preferably longer, as the black residue may spoil the appearance of fruit. Apply at 2 oz to 4 gallons of water.

Insecticides

Lindane (gamma isomer of benzene-hexachloride — BHC): The original BHC, while effective against insect pests gave a decided taint to edible plant parts. Lindane now does not have this defect, but is still efficient against aphids and other insect pests. It gives excellent summer control of woolly aphid. It has doubtful compatibility with alkaline materials. Use at the rate indicated by manufacturers, according to the percentage of active ingredient in specific brands. It should not be applied to fruit crops within three weeks of harvesting.

Malathion is a mild type of organo-phosphorus material with relatively low toxicity to humans. It is a most effective control for many types of insects, including aphids, leaf hoppers,

AGSERV*

introduced

Geigy DIAZINON

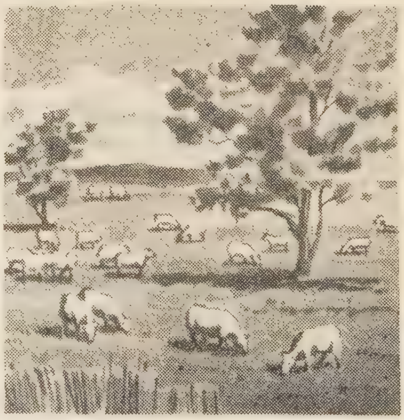
to the N.Z. Farmer

Agricultural Services (N.Z.) Ltd. offers a complete range of dipping materials based on DIAZINON and sold under the GEIGY brand.

GEIGY DIAZINON

Controls Resistant Blowflies.

Does not leave residues in the fat of treated animals.



GEIGY DIAZINON products have been in use in New Zealand for several years. They have been tested and proved in the field by practical farmers.

They are manufactured to Geigy's stringent specifications under the supervision of experienced and qualified technicians.

INSIST ON GEIGY DIAZINON PRODUCTS

manufactured and distributed by

***AGRICULTURAL SERVICES (N.Z.) LTD.**

NEW PLYMOUTH

All GEIGY DIAZINON products are registered pursuant to The N.Z. Stock Remedies Act, 1934. G.36

and mites. Use at ½ fl. oz. to 4 gallons of water. It should not be used within seven days of harvest.

Sevin (n-methyl-1-naphthylcarbamate) is a safe insecticide less toxic than DDT. It will control most of the major pests and diseases of apples and pears, being effective against codling moth and leaf roller, and gives good control of leaf hopper and leaf-curling midge. There is also some evidence of its efficacy against scale insects and bud moth in berry fruits, but it is not effective against mite. Use at 1 oz to 4 gallons of water.

Protection of Bees

As with other insecticides, the three materials above are toxic to bees and should not be applied during the flowering period.

Precautionary Measures

Even with these milder types of insecticides care is necessary. Low toxicity does not mean that these materials can be treated casually. Elementary precautions always necessary are:

1. Avoid smoking or eating while spraying.
2. Thoroughly wash exposed parts of the body immediately after spraying.
3. Store in a safe place out of reach of children.

Some of the fungicides and insecticides mentioned have been gradually incorporated in standard spray programmes. Others are listed as useful alternatives, but are rapidly coming into more common use as their beneficial properties become more widely appreciated.

In spite of the improved control and reduced damage to foliage and fruit with these newer materials, however, most home orchardists may prefer to use the simpler, and in most instances cheaper, materials they have used in the past. These older materials are quite satisfactory, and some will give good control of pests and diseases with less spray than when the newer materials are used.

Many of these newer materials are quite specific in their control, compared with the more general control of the older ones, and frequently two separate new materials must be used to control two different diseases or pests, whereas the older types of material covered a wider range of pests or diseases reasonably successfully.

Manurial Requirements of Orchard Trees

In many parts of New Zealand the rainfall this year has been well above average. Where this has resulted in waterlogged soil, or where soils have been slow to dry out, considerable nitrogen losses may have occurred through leaching or denitrification, as, without enough air, the soil nitrates break down into elemental nitrogen or oxides of nitrogen, a form in which nitrogen is readily lost. A further factor contributing to nitrogen losses that may be quite important is that conversion of soil nitrogen to nitrates, the form in which it is required by the trees, proceeds very slowly in cold, wet ground, and consequently nitrogen available to the tree may have been below requirements for some considerable time.

Other major plant foods are less readily lost in a wet year. Phosphates are perhaps the most tenaciously held in the soil. Though much phosphate is in water-soluble form, it is quickly converted in the soil into less soluble compounds and is washed through very slowly indeed. Potash is also held fairly firmly by soils, except perhaps in a very light soil.

With manurial applications this year, therefore, the emphasis should be on nitrogen, preferably in a form readily available to the tree. The slower-acting organic manures such as dried blood or blood and bone should be replaced at this stage by quicker acting nitrate of soda, which is readily and wholly available, or sulphate of ammonia, which is quick acting, though it must undergo a change before absorption. As a supplement to normal manure applications, 1½ to 2 lb per tree of one of these materials will help to overcome any temporary nitrogen deficiency.

"Complete" manures (that is, a combination of nitrogen, phosphate, and potash in one mixture in proportions suitable for orchards) are now available in a granulated form of readily soluble materials. These provide an easy and satisfactory method of applying fertilisers to the home orchard. A good dressing of "complete" manure in an orchard in full bearing would be 5 to 6 lb per tree.

For those who prefer to make up their own mixtures a combination of the three major elements in both slow and quick acting forms is best. A good combination for standard use is the following:

1 part sulphate of ammonia (quick-acting nitrogen)

2 parts blood and bone (slow-acting nitrogen plus slow-acting phosphate)

2 parts superphosphate (quick-acting phosphate)

1 part sulphate of potash

Apply 5 to 6 lb per tree for trees in full bearing.

Animal Manures

If available, stable, farmyard, and such animal manures should be used, but these require to be supplemented by chemical fertilisers. Actually, these organic manures contain only relatively small amounts of plant food and enormous quantities would be required to equal the fertiliser mixture outlined above. They do, however, contain the three major elements in reasonably balanced proportions, and in addition provide many of the minor elements often required.

This type of manure also not only benefits the soil by the plant foods it contains, but improves its physical condition. Heavy loam or clay soils become more porous, assisting aeration and drainage, while light, sandy soils become more retentive of moisture and the soil particles are better held together. Bacterial development, which plays a very important part in the fertility of soils, is assisted by the presence of organic matter, and it is by this agency that the decomposition of the organic matter and the formation of humus take place.

Lime

Fruit trees generally are very tolerant in their lime requirements and will thrive in a wide range of soils, from moderately acid to moderately alkaline. Lime, however, not only corrects undesirable acidity or sourness of the soil, but it also acts on the organic matter and insoluble minerals and makes these nutrients available for the growing trees. In this way potash and nitrogen may be liberated. Desirable bacterial activity also is often enhanced by lime application. For these reasons light maintenance dressings are advised, particularly in heavier soils. An annual application of 4 oz per square yard provides a good maintenance dressing.

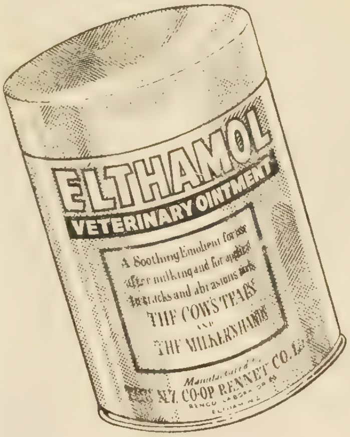
In the berry fruit garden lime should be used more sparingly. Strawberries and raspberries in particular will rapidly become unthrifty after excessive lime applications.

Routine Summer Work

Spraying must be maintained to control diseases and pests. Stone fruits should receive pre-harvest sprays of captan for brown rot control, three weeks and one week before harvest. Insecticide sprays in particular should be continued on pip fruits for the control of codling moth and leaf-roller caterpillar.

Citrus trees should receive a summer copper oxychloride spray to control verrucosis and other fungous diseases, and later a summer oil spray to control scale insects and sooty mould. Berry fruits, after harvest, should receive a

Renowned because it's proved reliable . . .


ELTHAMOL
VETERINARY OINTMENT
A Soothing Emollient for use after milking and for application to cracks and abrasions of THE COW'S TEATS AND THE MILKERS' HANDS
Manufactured by N.Z. CO-OP RENNET CO. Ltd

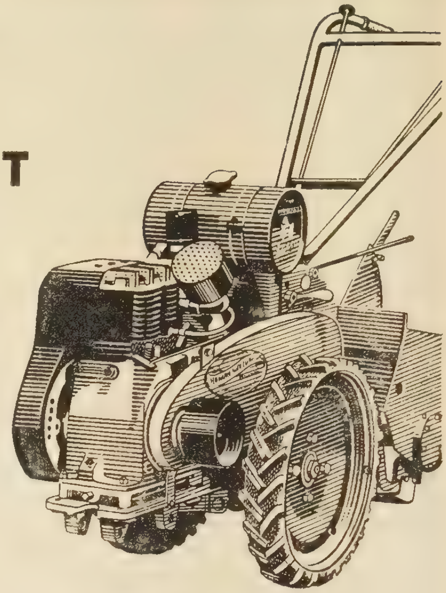
Reliable because experience has shown that Elthamol Veterinary ointment is really excellent for chaps . . . cracked teats . . . bruised udders. This safe, effective salve is sold in 2, 10 and 36 lb tins. For economy buy the large size.

ELTHAMOL
VETERINARY OINTMENT

Prepared under strict laboratory control by the N.Z. CO-OP. RENNET CO. LTD., ELTHAM.

Available from Stock and Station Agents and Dairy Factories.

- **ECONOMICAL**
- **VERSATILE**
- **COMPACT**



3 Features that indicate today's **FIRST CHOICE** in All-Purpose Farm Machinery

The cultivator that's small in size and price—but what a capacity for work! So easy to operate, it saves cultivation, time, and money. Profits speak for themselves! Call and inspect the Howard Terrier—you'll be amazed when you see its possibilities.

HOWARD TERRIER ROTARY HOE

With reverse gear as standard.

THE DOMINION MOTORS LIMITED
Licensed Motor Vehicle Dealers.
AUCKLAND - WELLINGTON - CHRISTCHURCH - TIMARU

Here they are again!

THE "SCENIC DAYLIGHTS"

Fast, Comfortable, Daytime, Diesel-hauled, Summer Holiday Express Trains between Auckland and Wellington

1961-62 Season

Every Monday and Saturday from Monday, December 18, to Monday, January 29, 1962 (except that the trains will run on Boxing Day, Tuesday, December 26, instead of Christmas Day).

SPECIAL REDUCED FARES!

FULL INFORMATION AT ANY RAILWAY BOOKING OFFICE

NEW ZEALAND RAILWAYS

M4/12

copper-lead arsenate or copper-DDT spray to prevent carry-over of diseases and pests.

Irrigation

Fruit trees frequently require irrigation during summer, particularly stone fruit as the crop nears maturity. The fruit rapidly swells during the last few weeks before harvesting and at that stage additional water is necessary if the rainfall is not regular and frequent. During dry periods the ground around trees should be given a good soaking at least every 10 days. Light sprinklings are of little value, as there is seldom enough moisture to reach the root zone.

Mulching

As a supplement to irrigation, mulching of the ground round trees with straw, grass clippings, or sawdust will keep the soil moist and cool and reduce the loss by evaporation of some of the water that has been applied through irrigation.

Harvesting

With the exception of cherries, which are usually firm when ripe, stone fruit is at its best when it has been allowed to reach the "soft-ripe" stage before picking. Slight pressure with the fingers will indicate when the fruit is soft and ready to pick, and fully tree-ripened fruit can be removed at a touch. Every care must be taken, of course, in handling this fully ripened fruit.

If it is desired to hold stone fruit for a day or two before using, harvesting time can be advanced a little. Some of the quality is sacrificed, but quite attractive and well flavoured fruit can still be harvested at this stage. Fruit in this condition also is at the best stage for bottling or preserving. At harvesting it still requires as much care in handling as fully ripe fruit. Though not so soft, it is still easily bruised and remains a highly perishable product.

Fruit intended for jam or culinary use can be picked at an earlier stage still, and even quite immature stone fruit, particularly plums, make excellent jam.

Early varieties of apples and pears also will be approaching maturity at this time. These fill an important gap in the fresh fruit supply, but should be treated much the same as stone fruit and put to immediate or early use. As a rule they are poor keepers and should not be relied on to hold for more than a week or so off the tree. Fruit maturing during the summer should be "used as it ripens" and autumn-maturing kinds relied on to provide supplies for the rest of the year.

◆

Freedom - from - Hunger Campaign

THE use of high-quality seed of improved varieties is one of the cheapest, simplest, and most effective ways of increasing and improving food production. Through FAO's World Seed Campaign more than 65 countries are working together to see that reliable seed will be made available to farmers at a reasonable price.

Since the World Seed Campaign was launched in 1957 there have been many examples which illustrate its value. Two which stand out are one in Yugoslavia and another in Egypt.

In Yugoslavia high-yielding Italian wheat varieties were introduced with the result that in two years total production rose by 30 per cent and, from having to import more than 10 million hundredweight of wheat a year, Yugoslavia has become self-supporting in wheat for the first time in history.

In Egypt in only four years an improved rice variety was multiplied and distributed to farmers on such a scale that it now covers more than 85 per cent of the country's total rice growing area and production has increased by 185 per cent.

FOR FULL MILK PRODUCTION

THIS COW NEEDS

15 GALLONS

of water each day

Butterfat production can be maintained only when stock condition is maintained. Water is the key to higher production. Today ample stock-watering in every paddock is no problem. With Contour Polythene Pipe the farm can achieve full farm reticulation simply—inexpensively—quickly.

AK4065

Contour Pipe is covered by an unconditional guarantee — every foot is manufactured from virgin polythene made expressly for producing Polythene Pipe — it cannot rust, corrode or burst under recommended working pressures.
More farms in New Zealand are reticulated with Contour Pipe than by any other piping.

SOLE SELLING AGENTS:
Neill, Cropper & Co. Ltd.
P.O. Box 9, Auckland
P.O. Box 583, Wellington
P.O. Box 1378, Christchurch
P.O. Box 703, Dunedin

"Garnite" and "Contour Pipe" are the registered trade marks of A.C.I. Plastics Pty. Ltd., Penrose, Auckland.

Garnite **CONTOUR PIPE**

LOOK FOR THE NAME CONTOUR AND IDENTIFYING STRIPES. RED FOR NORMAL PRESSURE, WHITE FOR HIGH PRESSURE. IN A FULL RANGE OF DIAMETERS.

ROUND THE RESEARCH STATIONS

Current Work and Findings in Department of Agriculture and Department of Scientific and Industrial Research Trials and Experiments

Rukuhia

Rush Control on Peat Heavy infestations of rushes are frequently a serious problem on peat land. Investigations at the Rukuhia Soil Research Station's Moanatuatua peat area over the past three years have shown that frequent regular cutting gives a reasonable degree of control but not complete elimination.

The trials suggest, however, that spot spraying rushes with high rates of 2,4-D, preferably six to eight weeks after cutting, can give good and lasting control. Spot spraying by knapsack, spray gun, or selective boom sprayer enables a high rate of 2,4-D to be applied to the rushes without seriously damaging clover growth. As only the rush plants are sprayed, the amount of 2,4-D used per acre is still small, even though a high concentration of 2,4-D is used on the rushes.

Further investigations will determine more fully the rates to be used at the different stages of growth.

Crop Research Division

Breeding for Resistance to Cauliflower Mosaic in Turnips Cauliflower mosaic virus in some recent years has ravaged a large part of the turnip crop in the South Island. No turnips resistant to the disease have been found, but some swede varieties are not greatly affected by the virus. Turnips have been crossed with these swedes in an attempt to transfer this resistance from swedes to turnips.

Swedes and turnips belong to different species, and though they are easily crossed, the first generation hybrids set little seed. In the second generation a welter of forms combining swede and turnip characters and many odd forms unlike either parent are produced. Later generations have given segregates like swedes and turnips and these are being tested for resistance to the effects of the virus.

It is not yet known how successful this programme will be, but it is clear that some characters can be transferred from swedes to turnips or from turnips to swedes by this method, and it seems likely that it will be possible to breed a turnip variety resistant to the virus.

Invermay

Responses to Potash Extremely marked responses to muriate of potash have been shown recently in a pasture trial at Invermay on a yellow grey earth silt loam soil probably mixed with some alluvial silt loam. These have been obtained under conditions not truly typical of farm practice, but the results are sufficient to warrant a series of further investigations to keep abreast of the situation in farm practice.

It was found in this trial that two successive hay cuts removed sufficient potash from the soil to necessitate the use of potassic fertilisers to maintain healthy clover growth. Also the need for potash was greatest where high rates of phosphatic fertilisers were used.

From this trial and reports of Farm Advisory Officers in many areas of Otago and Southland it appears that as farming becomes more intensive potash may become necessary. This may apply today on some dairy farms, particularly on paddocks cut for hay.

Levin

Glasshouse Heating Trials The capital cost of installing hot water or steam systems of glasshouse heating is very heavy. An alternative method is to use hot air, and the capital cost of this method is very low. Trials on glasshouse heating with hot air are at present being undertaken at Levin Horticultural Research Station. A 100,000 B.T.U. per hour glasshouse heating unit was installed in a 3,000 sq. ft. glasshouse at the beginning of July. The unit consists of a forced draught vapourising oil burner inside a heat exchanger. Air is drawn into the unit from the glasshouse at the rate of 2,000 cu. ft. per minute and blown over the heat exchanger before being distributed through the glasshouse by thin-walled perforated polythene tubing. The air passing through the unit is heated to about 80 to 100 deg. F above air temperature in the glasshouse.

The heater has been installed to protect tomato crops from frost damage and was expected to raise the temperature in the glasshouse about 14 deg. F or to maintain a glasshouse temperature of 45 deg. F on nights with up to 12 deg. of frost. It has performed better than expected from the calculation, though there have been no 12 deg. frosts. The heater is fully automatic and is controlled by thermostats. Inside temperatures have not fluctuated by more than about 3 deg. F from the temperature set on the thermostat on nights when the rate of heat loss from the glasshouse has been less than the capacity of the heater.

Further experiments are now being made to find the efficiency of distribution of heat through the glasshouse and in particular to determine the presence and extent of temperature gradients within the glasshouse.

What's on the menu ?

Good green grass, nutritious and prolific, adequately fertilised . . . free of weeds and insect pests. Grass is New Zealand's most important farm crop, yet the one that is so often left to fend for itself when it should be receiving help. That's where Shell's unique service to the farmer can help. The number of agricultural chemicals developed and marketed by Shell is comprehensive — insecticides, weedkillers, fungicides, seed dressings, soil fumigants and fertilisers. And finally, working closely with the farmer and the Government authorities, there is the Shell Technical Service, a *practical* aid, freely rendered. Your appointed Shell Distributor can advise you and, if necessary, ask a Shell Field Representative to call on you at your farm.

For up-to-date farming you'll want
SHELL AGRICULTURAL CHEMICALS

For further technical information write to Shell Oil New Zealand Limited
Auckland • Wellington • Christchurch

Town Supply Herds Certified Clear of Reactors to Tuberculin Test

DURING July the following town milk suppliers were issued by the Department of Agriculture with clear herd certificates declaring that their herds are free of reactors to a tuberculin test.

To qualify for a clear herd certificate a supplier's herd must have no reactors to a tuberculin test of the whole herd. A herd comprises all cattle over six months of age depastured or kept on one property and includes dry or other stock from the property temporarily on a run-off. Where two or more herds share a common run-off all the herds using it have to be tested before any of them can qualify for clear herd certification.

In the list below the figures after each supplier's name and address are the number of the animals tested and these are followed by the date of the test.

These herds will be recorded in the New Zealand Register of Clear Herds, compiled by the Department of Agriculture.

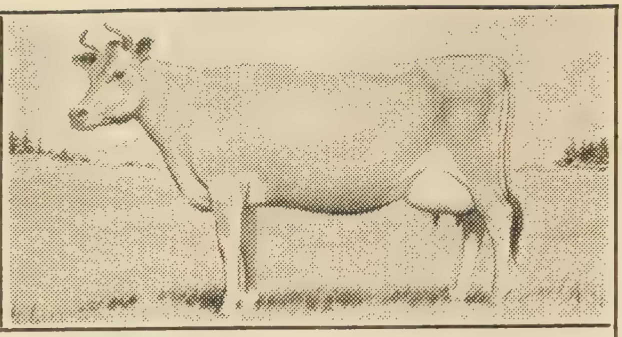
AGNEW, D. J., Oaro, R.D., Kaikoura, 38, 26/6/61
AITKENHEAD, J. A., Paretai, Balclutha, 50, 8/8/61
ALFRISTON FARMS, Alfriston, R.D., Manurewa, 40, 22/8/61
ALLAN, G. D., Winchester, 26, 8/8/61
ANDREWS, C. G. E., & Son, Beach Road, No. 1 R.D., Papakura, 98, 10/7/61
ARCHER, N. W., 25 South Belt, Rangiora, 16, 7/8/61
BAIRD, G., Ladbrooks, No. 2 R.D., Christchurch, 32, 29/8/61
BARCLAY, B. G., Trices Rd., Halswell, 54, 30/8/61
BASSETT, W. F. & D. J. W., Moore Valley, Wainuiomata, 56, 23/6/61
BATKIN, B. W., Hunua, 4 R.D., Papakura, 86, 1/8/61
BATKIN, R., Hunua, 4 R.D., Papakura, 100, 1/8/61
BEAUCHAMP, R. R., Hoon Hay Valley, Halswell, 33, 28/8/61
BELL, K. G., Ardmore, 47, 31/7/61
BELL, R. E., Puhinui Rd., Papatoetoe, 59, 15/8/61
BENNETT, P. S., 9 O R.D., Waianakarua, Oamaru, 25, 1/8/61
BISSETT, W., Paretai, Balclutha, 56, 8/8/61
BORSTAL FARM, Liffey St., Invercargill, 126, 28/8/61
BOTHAMLEY, R. W., P.O. Box 26, Te Horo, 130, 31/7/61
BOYD, D. W., Radcliffe Rd., Christchurch, 47, 31/7/61
BREWER, D. L., 1 R.D., Taupiri, 98, 31/8/61
BROWN, C. W., Queen St. East, Levin, 103, 14/8/61
BULLIANS, R. K., Box 2, Taumarunui, 79, 18/8/61
BULLOCK, J. H., 17 C R.D., Oamaru, 49, 1/8/61
BURNS, R., No. 3 R.D., Gore, 26, 21/8/61
CANTERBURY FROZEN MEAT Co., No. 2 R.D., Ashburton, 2, 11/8/61
CASE, A., & PETHIG, J., Quaifes Rd., Halswell, 46, 23/8/61
CHAMBERLAIN, W. H., 402 North Rd., Styx, 9, 28/8/61
CLARK, E. A., Greenpark, No. 4 R.D., Christchurch, 93, 18/8/61
CLARK, L. R., No. 2 R.D., Greenpark, Christchurch, 42, 24/8/61
CONGREGATION OF OUR LADY OF THE MISSIONS, 64 Ryans Rd., Upper Riccarton, 13, 30/6/61
COX, A. E., Matatoki, 1 R.D., Thames, 109, 23/8/61
COX, F. W., Waimak. Bridge, Belfast, 35, 7/8/61
CRANE, B. B., 10 Virginia Rd., Wanganui, 51, 14/8/61
CUNNINGHAM, P. G., Taitapu, No. 2 R.D., Christchurch, 62, 29/8/61
DAVIDSON, C. S., 9 Wortley Rd., Lepperton, 21, 13/8/61
DAVIE, J., Temuka, 20, 8/8/61
DAVIS, L. W., Station Rd., Wiri, Manurewa, 102, 18/8/61
DICKIE, R. F., No. 4 R.D., Gore, 110, 7/8/61
DONOGHUE, J. C., Ardmore, R.D., Papakura, 46, 17/7/61
DOONEY, B. F., Pukekohe East Rd., Runciman, 55, 17/7/61
EADY, K. L., Otawhao, R.D., Takapau, 65, 24/7/61
EATON, J. G. T., Ludstone Terrace, Kaikoura, 57, 11/6/61
EDEN, L. J. W., Greenpark, No. 2 R.D., Christchurch, 48, 24/8/61
EMPSON, T., R.D., Te Horo, 145, 21/8/61
FIECKEN BROTHERS, Taitapu, No. 2 R.D., Christchurch, 75, 29/8/61
FISHER, G. T., Greenpark, No. 4 R.D., Christchurch, 46, 24/8/61
FITZSIMMONS, C. C., North Rd., Clevedon, 120, 8/8/61
FLANAGAN, R., Camp Hill, Drury, 92, 21/8/61
FLETT, W. B., 1 R.D., Goodwood, Palmerston, 73, 8/8/61
FOOTE, J. E., Greenpark, No. 4 R.D., Christchurch, 39, 29/6/61
FORD, A., Bunners St., Palmerston, 41, 8/8/61
FROST, R. W., Balcairn, R.D., Rangiora, 50, 3/8/61
GARDINER, C. H., 8 Candys Rd., Halswell, Christchurch, 60, 14/8/61
GEDDES, J. D., Greenpark, No. 2 R.D., Christchurch, 83, 24/8/61
GOW, A. E., Waikaka, 7, 21/8/61
GREENE, J., Post Office, Meeanee, 45, 21/7/61
GRETTON, T. R., P.O. Box 321, Palmerston North, 50, 16/5/61
HANCOCK, T. & W., Richmond Rd., Lepperton, 102, 13/8/61
HARRIS, A. S., 190 Grimseys Rd., Styx, 30, 28/8/61
HART, R. J., No. 5 R.D., Palmerston North, 77, 7/8/61
HARVEY, H. J., Russell, 49, 27/7/61
HARVEY, W. G., McQuarrie St., Invercargill, 12, 22/8/61
HASSALL, W. R., Ladbrooks, No. 2 R.D., Christchurch, 59, 25/8/61
HAUGHEY, B. C., Main Rd., Temuka, 23, 8/8/61
HAVILL, A. S., Fernside, R.D., Rangiora, 96, 7/8/61
HAWKER, M. E., Waikite, 1 R.D., Rotorua, 120, 20/6/61
HIGGINS, M., Pukekohe East Rd., Runciman, 57, 8/8/61
HIGHT, R. A., Ladbrooks, No. 2 R.D., Christchurch, 33, 29/8/61
HODGES, M. G., Manunui, Taumarunui, 86, 20/8/61
HURFORD, W. L., Waikuku, Rangiora, 72, 7/8/61
JAMIESON, S. N., Karaka, No. 1 R.D., Papakura, 48, 8/8/61
JENKINS, C. E., Port Levy, R.D., Diamond Harbour, 74, 10/8/61
JOHNSON, M., P.O. Box 10, Sefton, 68, 27/7/61
JULIAN, D. F. & E. M., Manakau, 99, 7/8/61
KELLY, D. R., No. 10 R.D., Palmerston North, 87, 28/8/61
KENNEDY, C. E., Paretai, Balclutha, 77, 8/8/61
KERR, L. W., Coldstream, R.D., Rangiora, 42, 28/8/61
KING, R. H., Box 53, Manakau, 126, 31/7/61
KNIGHT, M. H., The Avenue, Levin, 128, 31/7/61
LAMBIE, H. (No. 2 Herd), Ihumatao Rd., Mangere, 96, 23/7/61
LANCASTER, C. S., Sefton, R.D., Rangiora, 55, 27/7/61
LAWS, Mrs. E. M., Valley Rd., Manunui, 51, 20/8/61
LEDINGHAM, L., 2 D R.D., Ardgowan, Oamaru, 34, 1/8/61
LESLIE, A. G., Oaro, R.D., Kaikoura, 110, 26/6/61
LINCOLN, T., Ellis Rd., Bennydale, 156, 3/8/61
LINDAUER, P. F. M., Box 12, Russell, 80, 27/7/61
LOGAN, D. T., 8 R.D., Palmerston North, 59, 9/8/61
McKAY, E. E. & C. R., No. 5 R.D., Kelso, Gore, 11, 7/8/61
McKENZIE, G. E., Boundary Rd., South Invercargill, 34, 29/8/61
MANSON, A. Q., Charteris Bay, No. 2 R.D., Christchurch, 3, 2/8/61
MARSHALL, Estate of A. W., Karaka, No. 1 R.D., Papakura, 125, 3/8/61
MARTYN, F. E., & Son, Bush St., Rangiora, 55, 3/8/61
MEIER, A. E., Mairoa Rd., Pio Pio, 55, 15/8/61
METHODIST CHILDREN'S HOME, Herbert St., Masterton, 5, 19/8/61
MILLEN, A., Marven Downs, Pakuranga, 115, 11/7/61
MILLER, F. J., Motukarara, No. 2 R.D., Christchurch, 91, 17/8/61
MILLER, W. C., Motukarara, No. 2 R.D., Christchurch, 156, 17/8/61
MILWARD, P. W., Claremont, No. 4 R.D., Timaru, 45, 8/8/61
MUIR, K., Alfriston-Ardmore, R.D. Manurewa, 49, 7/8/61
MUIR, R. I., Dorset Rd., Carterton, 123, 31/7/61
MURCOTT, W. J., Bennydale, 81, 3/8/61
NICHOLSON, N. A., & Co. Ltd., Manakau, 86, 7/8/61
PARKINSON, H. V., Karaka, No. 1 R.D., Papakura, 111, 14/8/61
PATTERSON, C. E., Pounawea, Owaka, 80, 8/8/61
PATTERSON, D., No. 8 R.D., Waimate, 12, 7/8/61
PENNY BROS., Waihemo, Palmerston, 46, 8/8/61
POLLARD, D. J., Box 26, Wainuiomata, 41, 21/7/61
PROUSE, H. S., Winchester St., Levin, 91, 1/8/61
PURCHASE, C., Tasman Rd., Otaki, 71, 22/8/61
RABY, J. F., Ormiston Rd., Papatoetoe, 48, 25/7/61
ROBINSON, A. E., Wallaceville Hill, Upper Hutt, 67, 15/8/61
ROBINSON, J. S., 11 D R.D., Oamaru, 61, 1/8/61
ROUNTREE, Estate C.H., 143 Winters Rd., Papanui, 16, 28/8/61
ROWLANDS, M., 33 Manutahi Rd., Lepperton, 68, 23/8/61
SEWELL, W. E., Driving Creek, Coromandel, 6, 20/8/61
SEYMOUR, Mrs. I. A., Inangahua Landing, 11, 24/7/61
SHIELLS, A. L., 104 Cass St., Kaiapoi, 23, 21/8/61
SMITH BROTHERS, Broadfields, No. 4 R.D., Christchurch, 29, 11/8/61
SPIERS, J., R.D., Ihakara, Levin, 110, 7/8/61
SPRATT, W. J., Maoribank, Upper Hutt, 43, 18/8/61
SPREYDON LODGE LTD., 155 Halswell Rd., Christchurch, 144, 28/8/61
STEELE, J. D., R.D., Tablelands, Opotiki, 134, 27/7/61
STICHBURY, A. W., Ostrich Rd., Patumahoe, 60, 25/7/61
STIVEN, R. B., Manse Bush, Tapanui, 9, 7/8/61
SUTHERLAND, D. W., Taitapu, No. 2 R.D., Christchurch, 38, 25/8/61
THOMPSON, R., Mangaroa, 4, 14/6/61
TOOLEY, R. W., Northbrook Rd., Rangiora, 42, 28/8/61
TOOMAN, H. E., Baverstock Rd., East Tamaki, 38, 14/8/61
TRIGGELL, M. L. S., South Makara Rd., Wellington, 99, 25/8/61
WARE, R. J., Ladbrooks, No. 2 R.D., Christchurch, 38, 8/8/61
WERDER, L. N., Makowhai Rd., Hawera, 89, 26/8/61
WHITTET, L., Ferguson St., Invercargill, 31, 22/8/61
WIGGIN, A., Estate of, 1 R.D., Hamilton, 70, 31/8/61
WILDE, H. M., 16 C R.D., Oamaru, 51, 1/8/61
WILL, J. K., Riversdale, 22, 21/8/61
WINTER, C. A., Lower Styx Rd., Belfast, Christchurch, 115, 7/8/61
YOUNG, R. K., Oruanui, P.O. Box 220, Taupo, 90, 31/7/61

Cancelled or suspended certificates

The following certificates have been cancelled or suspended:

BENTON, R. R., 55 Smart Road, New Plymouth
CAMERON, N., Westney Rd., Mangere
CHRYSTALL, B. M., 33 Wickstead St., Wanganui
FRANSHAM, F. J., Chapel Rd., R.D., Papatoetoe
HAWEA, T., Box 1, Te Horo
JORDAN, L. N., Kairau Rd., Sentry Hill, New Plymouth
ROBINSON, G. J., Wainui, R.D., Kaukapakapa
ROWE, G., No. 5 R.D., Hunterville
SMITH, J. A., 16 Smith's Ave., Papakura

Protect the health and wealth of your stock



Hit the mastitis that hits your herd use **VETSPEN** Cerate Hard-hitting Glaxo penicillin

For speed and certainty insist on VETSPEN. It's been thoroughly proved by years of experience.

The Glaxo range of cerates has been specially designed to provide the best means of controlling mastitis. The Glaxo base offers very definite advantages both in providing a cerate suitable for daily administration, and for long term use.

The full potency of every Glaxo cerate is completely guaranteed, thanks to our unrivalled experience of penicillin at all stages from manufacture to field use. Each tube gives a single dose, and has a specially fine nozzle for easy insertion into the teat canal.

VETSPEN Cerate	Colour Code	Pack
"25"	Blue	Flat, easy-to-pocket tins. Contain 12 tubes.
"50"	Green	
"100"	Bright Red	
* "500"	Dark Red	

* (available on prescription only)

EXPERT ADVICE. Antibiotics alone will not achieve a mastitis-free herd. Their use must be supplemented by necessary hygienic measures. Where mastitis is a persistant problem seek the advice of the expert—your veterinary surgeon.

PROVEN GLAXO PRODUCTS

V2.1

Gardens with Streams

A STREAM can be an asset or a liability in a garden, depending generally on the landscaping of the approaches and the manner in which the garden is laid out. A large stream can be incorporated as the main feature in the design, but a small stream may be used without being the dominating feature.

By K. H. MARCUSSEN,
Horticulturist,
Department of Agriculture,
Christchurch

The Large Stream

WHERE there is a large stream subdivision is usually planned so that the stream forms a boundary at the end of the property away from the road. Development should consist of laying out the garden down to the bank of the stream.

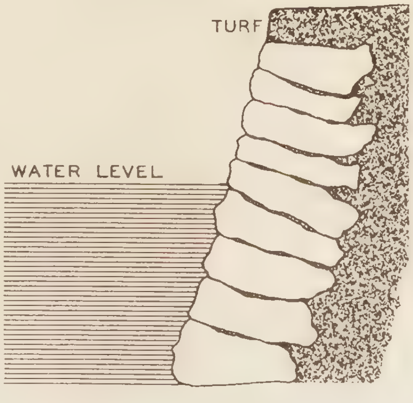
The central view from the house to the stream should be kept open, but height should be provided by the use of trees and shrubs near the water. They will give improved perspective and added interest.

Tall growing subjects should usually be confined toward the side boundaries in a small garden. The general view from the house will then be framed and more private, which is desirable if the garden is to be used for outdoor living.

The Opposite Bank

A difficulty associated with gardens terminating on streams is that there is no control of developments on the other side, which not infrequently is unkempt. This difficulty can, however, often be overcome. Whether it is private property or local body land on the other side, it is generally possible to obtain permission to do some beautification there.

Rank growth of grasses and weeds is often predominant and it may not be practicable to keep this in check on somebody else's property, but improvement can be made by judicious planting on the far bank. A good background for the stream is most desirable and taller plants can be used behind it, though the distant view should not be blocked off by too close planting. Subjects should be chosen for their flowers, fruits, variegated and coloured foliage or bark, autumn tonings and for their interest in a range of seasons. For the low growing shrubs it is desirable to use evergreens with dense foliage, for example, rhododendrons which tend to smother ground vegetation. Ferns and tree ferns are also useful for this.



Construction of a stone wall used for reinforcing a crumbling wall. The foundation must be firm and the largest stones should be used at the bottom. Each stone must fit firmly to prevent it from being dislodged by force of the water. Quarried stones are the most satisfactory. A batter of 3 in. in the foot of height should be given.

The Small Stream

Small streams on boundaries can be developed as described for larger streams, but it is not usually possible to make them such dominant features.

The water usually is gently flowing and often winding, or can be made to wind if the garden design requires it.

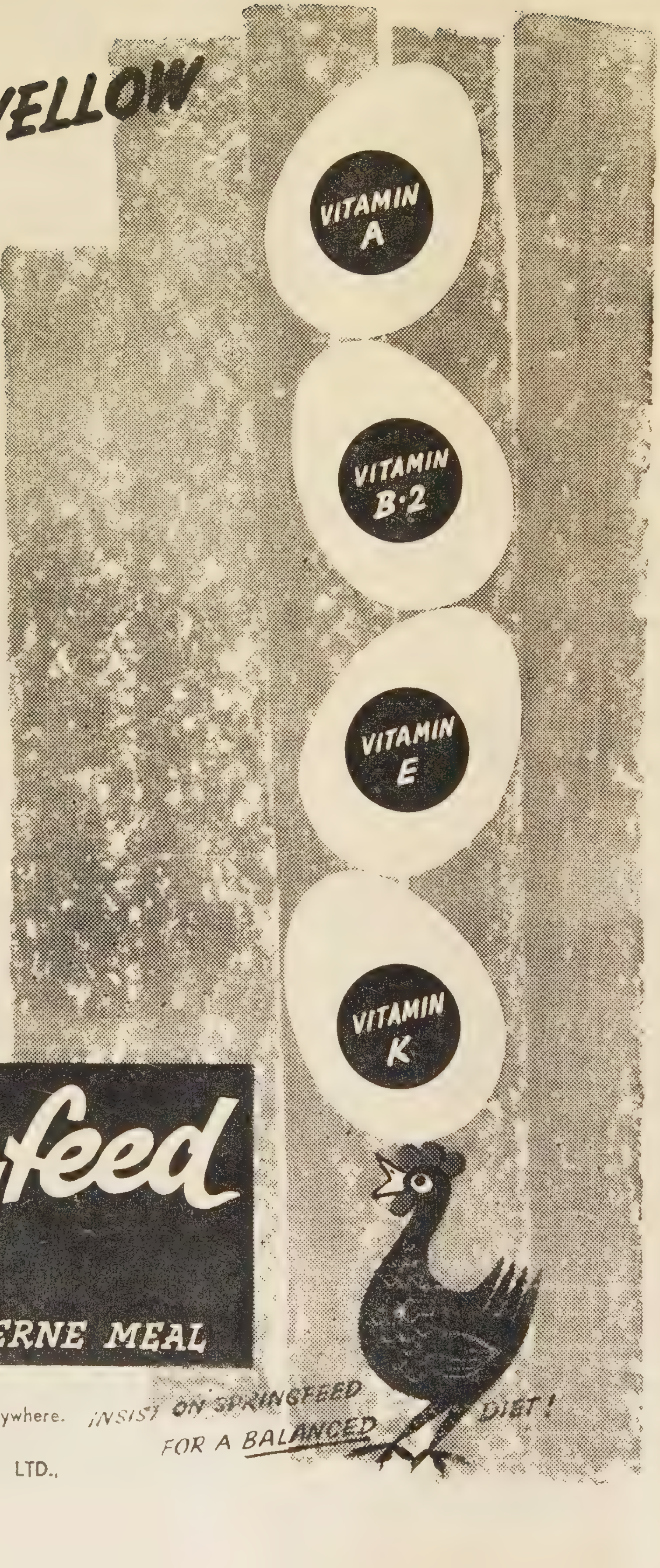
The garden can usually be built round the stream and where space permits, pleasant features can be incorporated by use of trees and shrubs, by spanning with bridges, and possibly by development of a pool or bog garden.

The Ditch

Ditches are very difficult to transform to a garden feature. They are service channels and the water flows very irregularly according to the time

All this—and SPRINGFEED YELLOW too!

Yes, Springfeed Dehydrated Lucerne Meal supplies vitamin A, Vitamin B2, E and K, full requirements for laying pullets, and Springfeed also gives greatly superior yolk colour . . . remember, the New Zealand housewife **demands** eggs with good yolk colour. In recent Official Field Tests it was proved that Lucerne Meal must be of **good quality** before it can be adequately relied upon as a source of vitamin A. That's why you should **insist** on Springfeed Dehydrated Lucerne Meal. Use 4% Springfeed Dehydrated Lucerne meal in your poultry mash for adequate vitamin A requirements **plus** good yolk colour.


VITAMIN A
VITAMIN B·2
VITAMIN E
VITAMIN K
INSIST ON SPRINGFEED FOR A BALANCED DIET!

IT'S THE COLOUR THAT SELLS THE HOUSEWIFE!

Springfeed

DEHYDRATED LUCERNE MEAL

In 50lb Waxed Multiwall Bags.
At Grain, Seed and Produce Merchants everywhere.

Made By
MARLBOROUGH LUCERNE MEAL CO. LTD.,
BLENHEIM

of the year and the rainfall; the flow may fluctuate between none at all and great turbulence. Because of this, ditches cannot usually be made part of the restful garden setting that is usually associated with water.

Often it is best to screen ditches off from the rest of the garden by permanent planting, for example, by shrubberies.

Artificial Streams

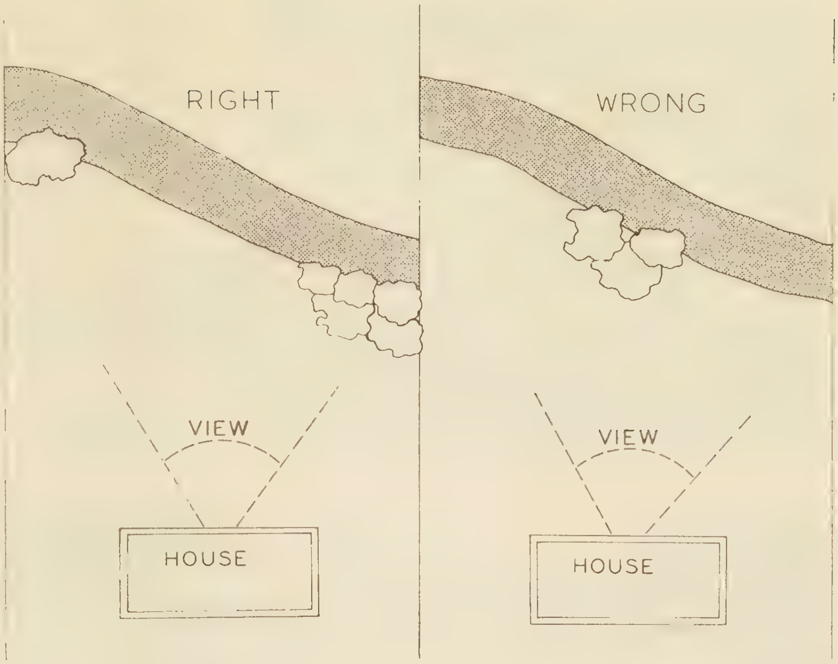
It is sometimes possible to use an existing artesian well, or drilling for water may be practicable where a good artesian flow is known to be available to make an artificial stream.

There are advantages in using water from an artesian bore. A natural stream is confined to its normal level and more or less to its normal position. Artesian water can be piped to any position where it may be required and, within reason, to any desired level. This means that it is possible to put water into a garden design instead of making the garden layout fit the stream.

A sloping garden can be made particularly interesting by building pools and waterfalls.

Such arrangements can of course also be made by mechanical pumping or the use of domestic water supply.

GARDENS WITH STREAMS

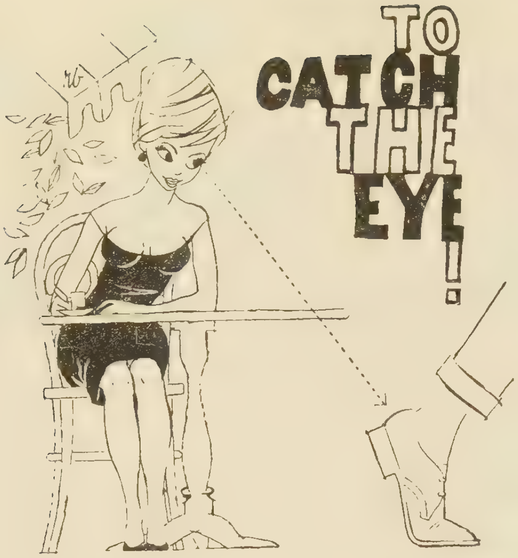


Placing of trees alongside stream in relation to view from house.

This stream has been developed into a series of pools by judicious use of stone. The approaches can be planted up with bedding plants, herbaceous perennials, rock garden plants, and bulbs.

The lawn is sloping gently to a firm bank and broken by dwarf planting. Features are the pleasant background on the opposite bank and the bridge.

TO CATCH THE EYE!



The new style in footwear
that earns men
another
look

FRANCISCO
Continental

MADE IN N.Z. BY M. O'BRIEN & CO. LTD

F1

DAD and DAVIES ON THE FARM

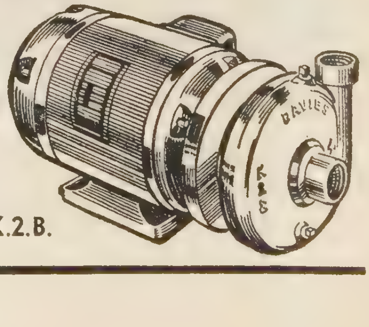
Dad's old fashioned. He wouldn't have one of those new fangled notions such as a Davies Shedwasher until one day he bought in a lot of new heifers. That convinced him a Davies Shedwasher was essential and now Dad is once again happy and cheerful, all due to that super efficient little Shedwasher he installed in the cowshed.

You can't afford to waste time . . . Scrubbing brushes and cleaning brooms are out when a Davies Shedwasher will do the job.

"Look! No Brooms!

Contact any of our agents or write to us direct for full information about our super efficient Shedwasher.

Manufacturers:
D. H. DAVIES & Co. Ltd.
BOX 12029, PENROSE Phones: 594-531 & 596-337
Agents throughout New Zealand



K.2.B.

DD14/61.

Neither of these methods, however, has the permanency of a natural flow and they are costly to operate.

If development of artificial streams is contemplated consideration must first be given to disposal of the water when it has served its purpose. In towns, it will probably not be permitted to run it into the storm water channels and it cannot be run off to a neighbouring section. This problem may not be so difficult in the country, but even so, it should be considered early.

Approaches to Streams

Wherever banks of a stream are approachable they should be firm and not too steep. Children will be drawn to water and will not be deterred by a slipping bank which could indeed be a special attraction to them. Hazards to children should be guarded against wherever there is water.

Where water is deep or swift flowing, banks tend to become eroded, particularly on bends, and it may be necessary to reinforce or stabilise them in such places or elsewhere where they are slipping.

Minor repairs can be made with well rooted turf if the bank is cut down to a firm foundation. The turves should then be stacked horizontally, not directly one on top of another, but similarly to bricks in a wall so that they will keep each other tied in position. The outside which forms the bank must of course be very even; any holes forming on the inside should be filled with soil and rammed down while the work is in progress.

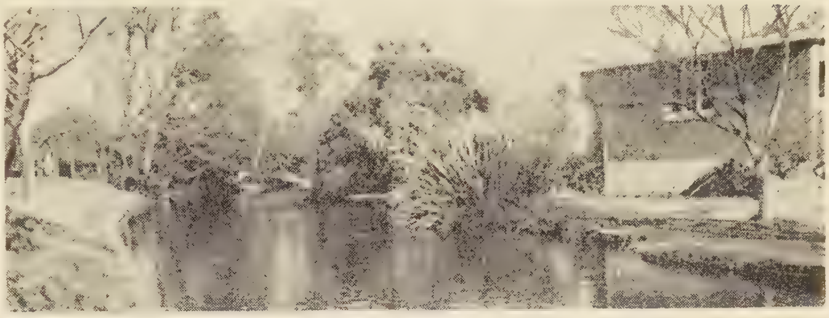
Major repairs are best done in stone, built up similarly to a dry stone wall used in terracing. When well constructed this type of bank is extremely durable and it fits well into a garden setting. Concrete can of course also be used but is not so attractive.

For a pleasing setting the garden should slope gently to the stream. This may involve shifting some of the soil, but with modern earth-moving machinery this is not difficult nor is the cost prohibitive. Soil cut away can probably be used elsewhere in the garden; changes in height give much more scope for layout. When deep cutting and filling are to be done the topsoil should be removed and replaced when the desired level has been reached; otherwise it may prove difficult to establish a garden on the poorer subsoil.

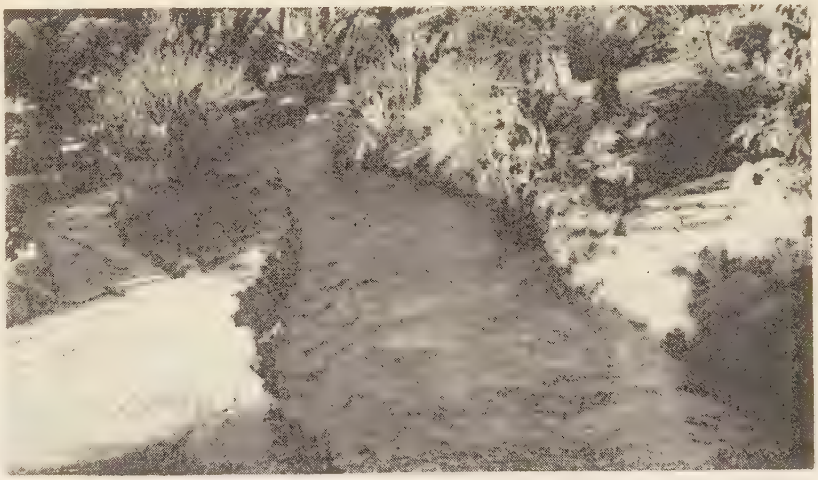
Lawns right to the water's edge look well and are easy to keep tidy where the grade is slight enough to use a lawnmower. Lawns will also provide better facilities for children playing and for garden parties and barbecues.

For a path along the stream concrete paving slabs put into the lawn as stepping stones should be considered. If they are spaced a little part, either square on to each other or diagonally, corner to corner, and placed level with the lawn surface they will be no obstruction to the mower. They provide the advantages of a solid path, but look much more attractive.

Flowering prunus are very effective alongside a stream.



A stream can also be a feature in winter. Flax has been used effectively in this planting.



Walks paved with flat stones are ideal alongside streams, particularly through closely planted shrubberies.

Trees and Shrubs

Judicious use of trees and shrubs sets off a stream. The extent to which they can be used depends on the size of the stream and its length through the garden. They should never be overdone. It is a mistake to obscure

pip fruits
stone fruits
berry fruits
cereals
brassica crops
vegetables
flower crops
nursery plants

ROGOR* 40

the proved systemic insecticide

Rogor 40 is the proved Systemic Insecticide for use on all food crops.

quick and persistent Rogor 40 combines a systemic action, which remains persistent in the plant, with a quick knockdown action at the time of spraying.

wide range Rogor 40 controls a wide range of pests, including spidermites, aphids, mealybugs, leaf hoppers, leafminers, thrips and certain scale insects.

Supplies and information from The Canterbury (N.Z.) Seed Co. Ltd., 208 Cashel Street, Christchurch.

Rogor 40 may also be obtained from your local branch of The New Zealand Fruitgrowers' Federation and Stantox distributors.

FISONS PEST CONTROL

* Rogor is a registered trade mark of Montecatini, Milan

▲ Crumbling banks should be reinforced with rocks.

A landing place can be made into a formal sunken garden. →

the stream or the distant view if it is attractive. Trees and shrubs should be used to create points of interest along the bank; in that way they will enhance the stream.

Most subjects can be used, but for planting close to the water's edge preference should be given to moisture lovers. The following are particularly suited:

Ashes, of which there are several smaller species.

Australian she-oaks, *Casuarina* sp., which have graceful needle-like foliage. They are especially useful, as they will tolerate the saline water of a tidal stream.

Lily-of-the-valley tree, *Clethra arborea*, with its lovely scented flowers. This tree is slow growing, but begins flowering early.

Liquidambar styraciflua, the North American sweet gum. This is one of the best for autumn colouring and keeps its leaves until fairly late in the season.

A number of native trees can be used: cabbage tree, kowhai, lacebark, ribbon wood, and rimu.

Trees well suited for damp positions are willows, poplars, alder, larches, and swamp cypress.

Some of the suitable shrubs prefer a sunny position; for example, amelanchier, azalea, and the viburnums, especially *V. opulus* types, but many others do equally well in partial shade.

Aucuba japonica has one-sexed flowers only and female plants will berry only if there is a male plant in the neighbourhood. The foliage, however, of the variegated varieties is attractive on its own.

Nandina domestica, the heavenly bamboo, has the same type of flowers and fruit.

The dogwoods *Cornus* sp. stand sun or partial shade equally well and so do hydrangeas, though the flower colours are clearer in a shaded position.

Fuchsias do best in partial shade and look lovely when the flowers are drooping above water.

Magnolia stellata is another shrub that looks well when the flowers are reflected in water.

Kalmia latifolia, the calico bush, and andromedas should be given a cool, shady position.

Most rhododendrons like some shade; some will even scorch in full sun.

Herbaceous Perennials and Bulbs

Planting along the banks need not be confined to trees and shrubs. Many herbaceous perennials do well in moist positions. A range of bulbous plants can also be used.

Bamboo is the tallest growing of the herbaceous perennials. Various types are now available. A clump of bamboo looks well near water, but too much bamboo shelter may encourage rats.

Two other large perennials are suitable mainly for bigger gardens. *Gunnera manicata*, with its large and striking foliage is sometimes called giant rhubarb. This really wants spaciousness to be in proportion to the landscape. The native flax and tree ferns are more useful subjects and very suitable.

The range of smaller plants is quite extensive. Many primulas are ideal; the feathery plumes of astilbe have a very graceful appearance; anemone, aquilegia, the marsh marigold *Caltha palustris*, geum, the tall lobelia *Lobelia cardinalis*, lythrum, mimulus, ranunculus, thalictrum, and trollius all have showy flowers. Hosta or funkia, the plantain lily, also has attractive foliage, and hellebore is a favourite for its winter flowers.

Bulbs can be planted normally or they can be naturalised. They look particularly well when growing in the grass under trees, but should be placed in groups, not scattered indiscriminately. Mowing of the grass must be curtailed while foliage and flowers are developing and it is best if the foliage can be left to ripen before it is cut down.

A number of bulbs other than narcissus will grow in moist soils. Some of the iris will grow in very wet conditions, as will winter aconite, *Eranthis* sp., the snake's head lily, *Fritillaria meleagris*, snowdrop, *Galanthus* sp., and snowflakes *Leucojum* sp.; and for shady positions wood lilies, *Trillium* sp., are suitable.

Keep Streams Clean

It is important to keep streams clean. Not only does a clogged stream look

BOAC makes even me feel like a tycoon

All you need to enjoy BOAC flight is an acquired taste for luxury. A weakness for good cuisine and comfort. Let BOAC's attentive, unobtrusive service spoil you for any other mode of travel. And spoiled you will be. You bring the tickets — buy them from TEAL or any authorised BOAC Agent — and the rest is up to us.

You're someone special by **B·O·A·C**

ON LUXURY FIRST CLASS OR LOW-FARE ECONOMY CLASS SERVICES

Six jetline services weekly from Sydney to London and three flights weekly from Honolulu. Don't forget there are hundreds of places you can stop at, for no extra airfare — Hong Kong for example — Beirut and a host of places in Europe and America.

BRITISH OVERSEAS AIRWAYS CORPORATION — with Air India, Qantas and Teal

N.Z.35

untidy, but pockets will form where mosquitoes can breed. Where this occurs the stream ceases to be an asset.

Many plants are spread by streams and if conditions are suitable, they can establish themselves further down stream or in lakes. Probably the worst species of the genera mentioned is *Iris pseudacorus*, which is claimed to have blocked streams in this country. Bulbs, tubers, and seeds are particularly likely to propagate where they are carried by water.

Work in the Flower Garden

Work in most flower gardens in December is reduced to a minimum and consists largely of keeping lawns and hedges trim, preventing weeds from seeding or smothering other plants, and keeping decorative plants flowering and growing.

Trim hedges early in December, making them narrower at the top than at the base. It is not too late to apply fertiliser to hedges which are not growing vigorously.

By JOY WATKINS,
Horticultural Advisory Officer,
Department of Agriculture,
Auckland

Mow lawns regularly as necessary, and trim the edges before the holiday. Mow Mercury Bay weed lawns to level them when tufts of more vigorous growth appear. Single plants of paspalum in a lawn may be eradicated by pouring power kerosene into the crown after spiking them with a fork or similar implement. New Mercury Bay weed lawns must be kept free of weeds by hand weeding or by the application of diuron or a proprietary weedkiller which will kill germinating weed seeds without seriously damaging the "lawn" plant.

When the weather is hot, with a good drying wind, hoe as much of the garden as possible, so that the weeds shrivel and are killed. Larger weeds and those growing among other plants require hand weeding, which is most easily done after rain or heavy watering has softened the soil. When the ground is completely free of annual weeds it can be maintained in that condition among perennial plants by spraying the surface with diuron, simazine, or similar materials which at light rates such as 1 oz to 120 sq. yd. will kill germinating seeds. Do not hoe after spraying.

Cut off dead flower heads to encourage the production of more buds. As delphiniums, lupin, and similar flowers fade, cut the spikes down, but not to ground level. Retain as many healthy leaves as possible on the plant to build up the crown for further flowering.

Tie in new growths of climbing plants so that they do not become twisted or broken. Branches of rambler and old-fashioned roses which have completed their flowering may now be cut out.

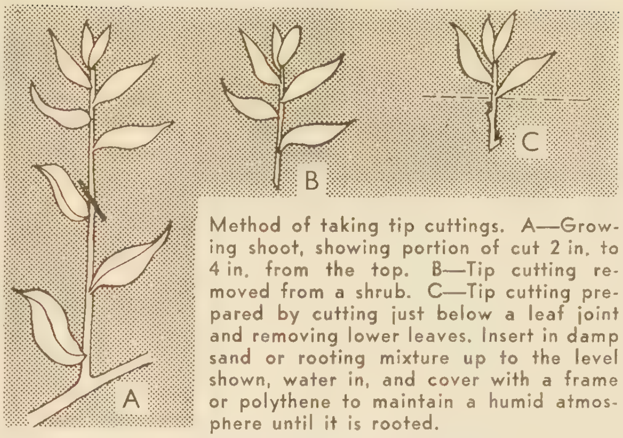
Many plants which can survive dry weather grow very much better if watered during dry spells. Roses, poinsettia, luculia, waratah, zinnia, and herbaceous plants respond well to watering in summer.

Plants with shallow root systems, those close to house walls, and those recently planted should have priority if the available water is limited. Give these plants a good soak in the evening if possible, and mulch immediately with compost or untreated sawdust. Scoria, crushed pumice, or small stones form a useful mulch where other materials are not available, as they conserve moisture. They are particularly useful for plants such as many alpine plants and Australian shrubs which require good drainage.

Feeding should not be neglected at this time of the year when plants are growing rapidly. Roses, N.S.W. waratah, poinsettia, chrysanthemum, dahlia, and gerbera are a few which respond well. A side dressing of blood and bone at 2 oz to the square yard or dilute liquid manure (either natural or proprietary mixtures) is suitable. Application of manures to dry soil can scorch the roots, so apply after rain or watering. The manures can then be hoed or washed into the soil.

Lift spring flowering bulbs such as narcissus, hyacinths, and tulips when the foliage has turned yellow. Dry off and store in a cool, dry atmosphere until ready for replanting.

Plant autumn flowering bulbs, belladonna, colchicum, sternbergia, miniature cyclamen, and nerines (except *N. bowdeni* which is not dormant until late autumn). Plant belladonna and nerines in full sun, with the neck of the bulb above ground. Belladonna is particularly suitable for naturalising in grass, and leaves are not eaten by animals. Nerines are good cut flowers at a time when there are few other than the "daisy" type of flowers, such as asters, chrysanthemums, rudbeckia, etc. *N. bowdeni* is a soft pink, with large flowers on stems about 2 ft long; *N. curvifolia major* (*N. fothergillii*) is similar but with crimson petals. The smaller spider lilies, *N. filifolia* and *N. erubescens*, with narrow twisted petals make good edging plants.



Method of taking tip cuttings. A—Growing shoot, showing portion of cut 2 in. to 4 in. from the top. B—Tip cutting removed from a shrub. C—Tip cutting prepared by cutting just below a leaf joint and removing lower leaves. Insert in damp sand or rooting mixture up to the level shown, water in, and cover with a frame or polythene to maintain a humid atmosphere until it is rooted.

Probably the best of the miniature cyclamen are *C. coum* and *C. neapolitanum*. They can be grown in well drained pockets of the rock garden or in the short sparse grass under pine trees.

Divide and replant flag iris as soon as flowering is over, as late planting may prevent flowering next spring. Cut back the leaves a little and replant in well drained limed soil in a sunny, open position. Plant the rhizomes firmly, with the top portion above the surface of the soil. Leaves become yellow and rhizomes rot if planted on badly drained soil or if the ground has been heavily manured with nitrogenous or animal manures.

If iris have developed these symptoms, lift them now and cut away all diseased portions of rhizome. Plant only the young healthy portions with their fans of leaves in fresh ground. Lack of flowers in iris may be due to poor soil conditions, late planting, or lack of sunshine. Many varieties which do not flower well are unsuitable for northern New Zealand, as the winters are too mild for them. The following are normally successful and should be planted as soon as possible:

Varieties such as Vanity, which bloom in both spring and autumn; varieties of bearded iris which make winter growth, such as Helen McGregor, Golden Majesty, Lady Boscawen, Fairy Love; the Californian and Japanese irises.

While they are in flower make a note of any groups of plants which are unsuitable because of height, colour, or other characteristics in their present position. Note also any outstandingly good combinations of plants which might be repeated in the home garden. These notes will be invaluable in late autumn or early spring when the plants can be lifted and replanted. Sow portulaca where they are to flower in a warm, sunny position.

Toward the end of the month sow Iceland poppy and pansy in a well prepared seedbed or frame. Keep the soil damp to encourage rapid germina-

If it's already Rusty you need
K-16
ANTI-CORROSIVE PAINT

This revolutionary paint 'loves' rusty surfaces, such as rusty roofs, and rusty iron and steel work of all kinds, and gives the appearance of new galvanising.

K-16 Anti-corrosive Paint is equally suited to tradesmen or amateur, to inland or seaside conditions, to home-owner or to heavy industry. Available from Hardware, Paint and Stock Firms in pints, quarts, gallons and 4 gallon tins.

HYGIENIC

CHEMICAL SANITATION

CHEMICAL ELSAN CLOSETS

AIR DRAUGHT

SAFE

ODOURLESS

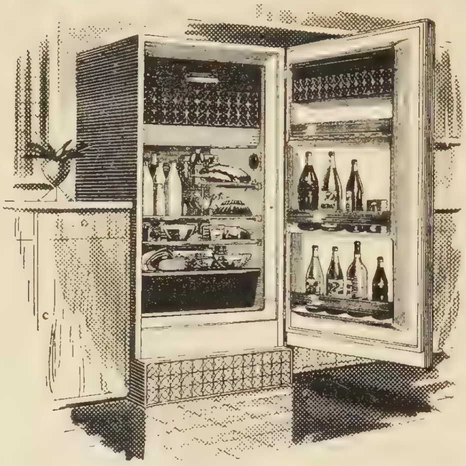
2 MODELS

PATENTED VENTILATION
UNCONDITIONAL GUARANTEE

If unobtainable locally, write for name of nearest stockist to:

UTILITIES LTD.
BOX 1306, WELLINGTON.
BOX 9244, AUCKLAND.

Your new 9·2 FRIGIDAIRE
will make this a
SIXTY-ONEDERFUL YEAR

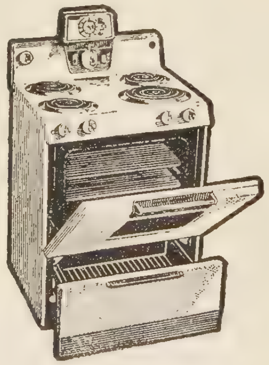


new 9·2 cu.ft. *'Flair'* by Frigidaire

Look at all that's new about the new Flair-styled 9.2 cu. ft. Frigidaire . . . the delicate lacework tracery . . . across-the-top Super Freezer . . . Magnetic Seal Door . . . Life-long nylon door bearings. Yours could be pure white, or one of the attractive Colourama tints. There are a host of other Frigidaire quality features: Non-rusting Roll-to-You Shelves, Door Pantry, roomy Chill Tray, Right or Left hand door opening, Sealed-in-steel "Meter-Miser". One Year Cabinet Warranty plus a Four Year Protection Plan on the Refrigerating system.

Only £125

— also for a Sixty-onederful year . . .
a FRIGIDAIRE ELECTRIC RANGE



With all the features you could wish for . . . Cook-Master for automatic cooking . . . fast heating easy-to-clean Radiantube Elements with 5 heat switches . . . extra large oven . . . Visidor so that you can see as you cook . . . convenient easy-to-set control panel . . . full width Warmer Drawer . . . and a choice of 6 models.

Priced from £92.

See your Frigidaire dealer next time you're in town.

F FRIGIDAIRE
PRODUCT OF GENERAL MOTORS

4641

tion and growth, and if necessary shade the seedbed. Sowing this month will ensure strong seedlings for planting out in March. The winter flowering varieties of pansies are valuable in all districts and may be obtained in distinct colours or mixed.

Shrubs

Water and manure as mentioned. Tip cuttings can be taken from many shrubs now. Only 3 or 4 in. of the new growth at the tip of a shoot should be taken, and prepared by cutting with a sharp knife or razor blade immediately below a leaf. Remove any leaves which would be under the propagating medium and insert the base of the cutting in damp sand or a light sandy mixture. To prevent wilting water the cuttings and cover with a frame. A bottomless box covered with glass or plastic is a suitable substitute for a frame. A glass jam jar may cause burning if the sun strikes any bubble or fault in the glass, but this is a useful substitute in a shady place. If the frame is placed in a semi-shaded position, it will require less attention during summer.

If rose stocks are available, they can now be budded in the traditional manner. Alternatively many varieties may be budded on to firm long stems of Cecile Brunner or of the rose stocks, inserting the buds about 8 in. apart. Plump buds of the desired variety are taken from firm, healthy wood which has grown this season, so that each bud has a thin shield of bark round it. A T-shaped cut is then made in the bark of the stock and the bark lifted with the point of the knife or the appropriate part of the budding knife, so that the bud shield may be slipped under it. Trim off any projecting bark and bind the bud securely in position with adhesive grafting tape or with wet raffia. If the bud has been inserted on the shady side of the stem, it is less likely to dry out.

In autumn, usually late March-May, cut the budded stem into lengths 6 to 8 in. long, each with the new bud at the tip, remove all other buds so that stock suckers will not develop, and place in the open ground to root. About half the cutting should be below ground. Insertion in March ensures that callusing and root formation are well advanced before winter. If the bud grows out, it can be pruned back to strong basal buds on the new growth in early August. In districts where winters are mild it is probably an advantage to take the cuttings in May, when the soil is still warm enough for rooting, but it is too late in the season for the bud to develop until spring.

House Plants and Glasshouse

Some house plants are not so attractive in summer, and these may be placed in a shade house. Plants with soft leaves resent disturbance and should be left in position in the home. Continue repotting.

Water plants more frequently. Maidenhair fern requires a considerable amount of water, so place the pot inside a larger pot or a deep glazed bowl or jardiniere and fill the space between with damp peat, moss, or sawdust. This method maintains the humidity round the fronds and considerably reduces the demand for water.

Feed house plants every 10 to 14 days during summer with weak liquid manure or a proprietary soluble fertiliser. The latter is often sold as a foliar feed, but is as effective when diluted in water according to manufacturer's directions and applied to the soil after watering. Fill the space between the soil surface and the rim of the pot with water and then when that has drained away, refill with dilute liquid fertiliser.

Propagation by leaf and stem cuttings is usually very successful at this time of year. The tips of young branches, about 2 in. long, should be taken and placed in damp sand to root. Enclose the pot plus cuttings in a plastic bag to maintain high humidity and prevent wilting of the cuttings.

Plants with fleshy leaves such as peperomia, African violet, and rex begonias may be propagated from leaf cuttings.

Select healthy leaves which are almost fully grown, as plants grown from very young or very old leaves are frequently unsatisfactory in growth and flowering. Remove the leaf blade with about 1 in. of stalk and place upright in the damp sand. Large leaves of begonia, streptocarpus, etc., may be laid flat on the sand after slitting across the main veins with a knife or razor blade. Cut right through the vein to allow the new plantlet to develop roots and leaves normally. Weight the leaf with pebbles to keep it flat and enclose the whole in polythene or a frame to maintain humidity and prevent the leaf from shrivelling.

Floral Decoration

Dried and driftwood decorations are invaluable during summer, when fresh cut flowers do not last long. Driftwood may be beautifully water worn and bleached out to a soft attractive colour by exposure to sun and salt water, but sometimes an attractive piece of tree root or branch is found which may be improved by smoothing with sandpaper and possibly giving it further treatment. The grain may be emphasised by painting the wood with white or coloured paint and then quickly wiping off all except that which has penetrated the cracks and small depressions in the wood.

Various stains or dyes may also be used so that the wood blends subtly with the foliage or flowers. If the major decoration is of dried material which requires little attention, a small arrangement of fresh flowers and foliage may be placed elsewhere in the room and replenished daily. Waterside plants such as iris and cyperus look well in Japanese-style arrangements in a shallow container. A few flowers and leaves supported by a pinholder at the edge of an expanse of water in the dish look cool and refreshing. Pebbles and shells are suitable accessories and may be used to camouflage the pinholder.

Christmas decorations centre round the Christmas tree, but the Norway spruce which is commonly used in Britain and the South Island does not grow well in the North Island and other types of conifer are grown for the purpose.

Cryptomeria japonica (the Japanese cedar) and *Cedrus deodara* (the deodar cedar) are probably the most attractive, and grow well in a tub or half cask.

Small trees may be lifted from the open ground and planted carefully in the container, but pot- or can-grown specimens are more certain to succeed. Watering is necessary as for any pot-grown plant. After Christmas sink the pot up to the rim in soil in a shady position outside. The large pot or can may be stood inside a decorative container when brought inside for the festive season, or it may be trimmed with coloured paper.

Traditional decorations as used in the Northern Hemisphere are not always obtainable or in keeping with celebrations in mid-summer in New Zealand, but the gay red and green of the sprigs of holly berries can be replaced with a bowl of bottle brush, pohutukawa, or deep red roses, and embellished with tall red candles and ribbon. This can be used as a table centre or mantelpiece arrangement. Tall candlesticks may be fitted with metal candlecups to hold flowers and trails of leaves at the base of the candle, and they make a lovely decoration to a dinner table without taking up very much space.

In many countries it is the custom to fix a door-knocker arrangement of evergreens and red ribbons on the front door, as a welcome to guests. This varies from an elaborately made holly ring to a simple cluster of greenery. To ensure that the sprays of pine, ivy, etc., last over the holiday period, cut the base of the stem and stand in deep water overnight, then push the stem ends into a ball of damp moss held in wire netting. The sprigs of greenery will be easier to fix in position if they have first been wired. A small cluster like a hand-spray, with a long trail of evergreen or of ribbons, is sufficient to make a most attractive decoration to the front door. Gilded or silvered pine cones may be added, and the leaves "frosted", if desired.

Instead of Pastry

By NAOMI F. BANKS, Home Science Instructor,
Department of Agriculture, Auckland

PASTRY is the traditional base or topping for pies, but many tasty substitutes, all easier to make than pastry, can provide interesting variations in texture.

Toppings

Scone Topping

Savoury: Next time you make a meat, fish, or savoury pie try a scone dough topping.

Make your favourite scone mixture and add cheese, chopped parsley or chives, herbs, finely chopped bacon or onion, according to your taste. Roll the dough, cut in rounds, and arrange on top of the bubbling pie mixture. Bake in a hot oven (450 to 500 degrees F) until the topping is cooked. This usually takes about 20 minutes.

For an even simpler topping make the scone dough a dropping consistency by adding extra milk. Spoon the mixture over the hot pie and bake as above.

Sweet: A sweet scone dough makes an excellent topping for fruit pies or stewed fruit. Add a little sugar, cinnamon, and chopped walnuts to a scone mixture. Mix with milk to a dropping consistency and drop spoonfuls over the pre-cooked hot fruit. Sprinkle with brown sugar and bake as above.

Crumble Toppings

3 oz of flour
1½ oz of butter
2 oz of sugar
¼ teaspoon of salt

Rub the butter into the flour until the mixture resembles fine crumbs. Add the sugar and salt, mix well, and sprinkle over pre-cooked or tinned fruit. Bake at 350 degrees F for 20 to 30 minutes.

This easy-to-make plain topping becomes a party special by the addition of chopped nuts, spices, coconut, finely chopped peel, grated lemon or orange rind, grated chocolate, or chocolate pieces. You can substitute brown for white sugar and should choose the extra flavour according to the fruit base being used.

Crunchy Top

2 oz of butter
½ cup of sugar
1 egg
½ cup of coconut
1½ cups of cornflakes
½ teaspoon of vanilla

Cream the butter and sugar together. Add the egg and vanilla and beat well. Work in the coconut and cornflakes.

Use this to spread over any fruit and bake at 350 to 400 degrees F for 30 minutes.

Savoury Bread Topper

Remove the crusts from thick slices of white bread. Dip in an egg and milk mixture. Arrange on top of the pie filling and sprinkle with grated cheese, salt, and pepper to taste.

Bake at 400 degrees F for 20 to 30 minutes or until the crust is golden brown.

Bases

Many pie recipes call for a cooked pastry shell, but as long as the filling is pre-cooked any of the following crusts can be used as a substitute.

Crumb Crust

1½ cups of finely crushed biscuit crumbs
⅓ cup of butter

Melt the butter and mix with the biscuit crumbs. Press the mixture evenly over the bottom and sides of the pie plate. Chill well before filling.

Luxury Ginger Crust

2 cups of finely crushed ginger nuts or brandy snaps
1 to 2 tablespoons of sugar
3 to 4 tablespoons of melted butter
Pinch of salt

Mix all together and press into a greased pie plate. Bake at 350 degrees F for five to 10 minutes.

Crisp and Crunch Crust

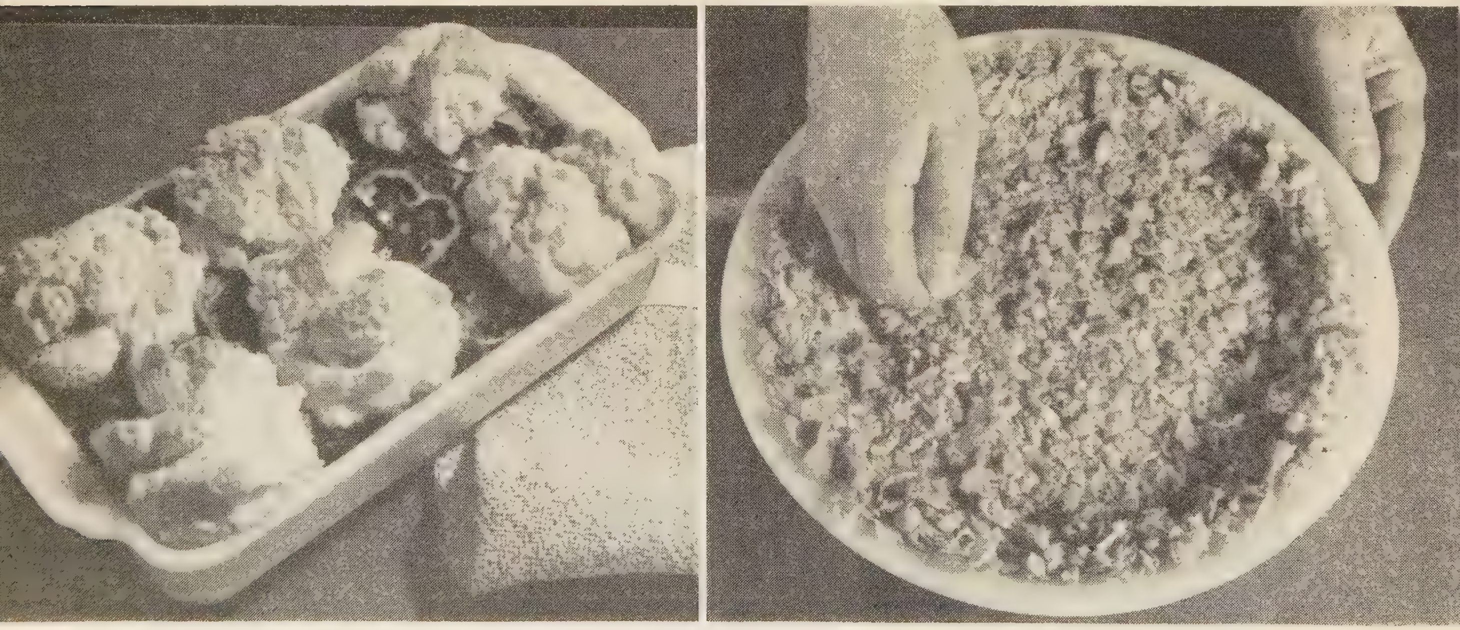
2 oz of crushed cornflakes
1 level tablespoon of golden syrup
2 oz of melted butter

Melt the butter, stir in the syrup, add the cornflakes, and press into a pie plate. Chill well before filling.

Citrus Crust

½ teaspoon of gelatine
¼ cup of orange juice
1 tablespoon of lemon juice
4 cups of cornflakes
2 oz of butter
2 oz of brown sugar

Soften the gelatine in the juices for five minutes and heat until dissolved. Add the butter and stir in the cornflakes and sugar. Press into a pie plate and chill before filling.



▼ Left: A plain scone dough makes a hearty topping for this mince and green pepper casserole. Right: Press the crust mixture into shape in the pie plate with your knuckles. Bring the crust well up the sides. Always chill before using.

[*Sparrow photos*

Cooking with New Zealand Wines

FOR flavouring food, wine was used before spices and is as easy to cook with as lemon juice or vanilla. Wine in food is valuable not only for enhancing the flavour, but also for colouring, for masking the ordinary, or for making insipid food almost exciting.

DO not hesitate to open a bottle of cheap wine for cooking. It will not have "gone off" by the time you want to use it again if you recork the bottle securely. The wine will keep well for weeks for cooking, though it would not be suitable for drinking. Cooking with wine is a splendid way to use up red or white wines left over from a meal.

There are approximately 170 wine-making establishments in New Zealand and the two main areas for vines are Henderson and Hawke's Bay. One of the objects of the Department of Agriculture's Horticultural Research Station at Te Kauwhata is to find grape varieties best suited to New Zealand conditions.

Over the years steady improvements have been made in the quality of New Zealand wines, especially the sherry type and the white table wines of the sauternes and hock type. The New Zealand climate is particularly well suited to the production of light table wines.

Wines produced in New Zealand are:

White wines

Dry	Sweet
Hock type	Sherry type
Chablis type	Madeira type
Riesling type	Sauternes type
Sherry type	Apple (similar to sweet sherry)
	Sparkling hock type

Red wines

Dry	Sweet
Claret type	Port type
Burgundy type	Sparkling Burgundy type

The Way to Cook with Wine

Wine can be used to soak food in before cooking, food can be cooked in wine, or wine can be added just before food is served.

Marinading (soaking the food in wine before cooking it) is one of the best ways of ensuring that the fullest use is made of the wine's flavour and fragrance.

Foods cooked in wine should be cooked slowly in a covered dish so that none of the flavour is lost. Seldom is more than ½ pint of wine needed. The effect of cooking on the wine is to evaporate the alcohol while retaining the special flavour and aroma of the wine chosen.

It is often sufficient to add a dash of wine to the cooked dish just before serving.

By JANET W. ROBERTS,
Home Science Instructor,
Department of Agriculture,
Auckland

The best way to start cooking with wine is to experiment a little, as there are no hard and fast rules. The colour of wines must be employed to the best possible effect, especially in wine jellies, cold sweets, and those dishes where the wine is only lightly blended. An unattractive colour can be given to some foods if a red instead of a white wine is used.

A simple general rule is to use white wine for cooking fish and red wine for cooking meat. The white wine is best for fish chiefly because of its colour, though red wine is often used for the coarser fresh water fish. Meat cooked in red wine will produce a dark brown sauce, but if you consider this too rich, use white wine. Wine does not combine well with egg dishes unless they are of the sweet or souffle type.

Burgundy Beef

3 lb of stewing beef
1½ oz of butter
6 rashers of bacon
6 onions
1 tablespoon of flour
1 pint of red wine
3 cloves of garlic (optional)
4 oz of mushrooms
Salt and pepper

Cut the meat into fairly small pieces and chop the bacon. Heat the butter in a thick saucepan. Brown the meat, bacon, and onions in the butter. Drain off the butter, sprinkle a little flour into the pan, and add the garlic, finely chopped.

Pour in the wine and a little water, just covering the contents of the pan, and season. Put the lid on the pan and simmer for two hours.

Cut the mushrooms into thin slices and add them half an hour before the end of the cooking time.

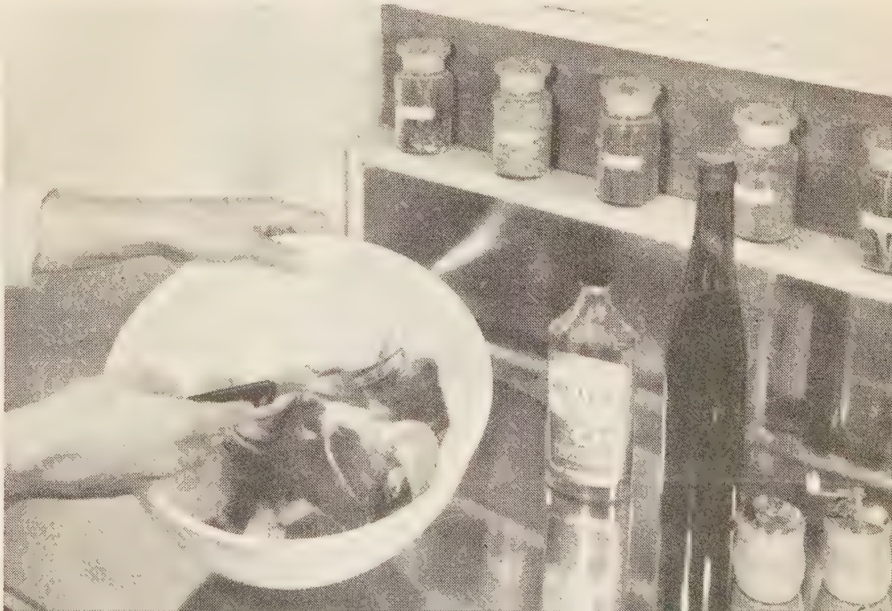
A Marinade for Steak

¼ cup of red wine
2 tablespoons of oil
1 small onion, chopped
½ teaspoon of salt
¼ teaspoon of pepper
Herbs

Mix the ingredients together and place the meat in the mixture to marinade for two hours or longer, turning the meat occasionally.

Drain and dry it before braising or frying. The liquid can be used for cooking the meat or for a base for making gravy.

▼ Turn the meat occasionally in the marinade when preparing marinated steak. A marinade makes meat tender and gives added flavour.



Slim Anna says:

Oranges are so kind to *figures...*

All figures, she means . . . Those on the watchful bathroom scales, the tell-tale ones of the measuring-tape and, of course, your own vital "vital statistics" — which decide whether you look and feel your best. Oranges eaten whole between meals restrict your appetite for high-calorie fat-forming foods. Besides being delicious, they are rich in protective and tonic properties — Vitamin C, protopectins to improve digestion, inositol to guard the liver from harmful deposits, bioflavanoids to tone up the capillaries (tiny blood vessels) and Pro-vitamin A for eye and skin health.

MAKE ORANGES
YOUR
DIET ALLY

GUIDE FOR COOKING WITH WINES

	Foods	Amount	Wines
SOUPS	Cream soups	1 teaspoon per serving	White table wine or sherry
	Meat and vegetable soups	1 teaspoon per serving	Red table wine or sherry
SAUCES	White sauce and variations	1 tablespoon per cup	White table wine or sherry
	Brown sauce and variations	1 tablespoon per cup	Red table wine or sherry
	Tomato sauce	1 tablespoon per cup	Red table wine or sherry
	Cheese sauce	1 tablespoon per cup	White table wine or sherry
	Dessert sauces	1 tablespoon per cup	Sweet sherry or port or madeira types
MEATS	Pot roast (beef)	¼ cup per pound	Red table wine
	Pot roast (lamb, veal)	¼ cup per pound	White table wine
	Gravy for roasts	2 tablespoons per cup	Any table wine or sherry
	Stew or casserole	¼ cup per pound	Red or white table wine
	Ham, baked whole	2 cups (for basting)	Port or madeira types
	Tongue, boiled	½ cup per pound	Red table wine
	Kidney, lamb's fry, braised	¼ cup per pound	Red table wine or sherry
FISH	Baked, poached, or grilled	½ cup per pound	White table wine
POULTRY	Chicken saute	¼ cup per pound	White or red table wine
	Gravy for chicken and turkey	2 tablespoons per cup	Any table wine or sherry
	Chicken, stewed or casseroled	¼ cup per pound	White table wine
	Duck, roasted	¼ cup per pound	Red table wine
FRUIT	Stewed or tinned	1 tablespoon per serving	Sweet sherry, port, madeira, or sauternes

---

Steak Creole

Grilling steak
Sufficient onions to cover steak
3 dessertspoons of Worcestershire sauce
Salt and pepper
1¾ cups of tomato juice
2 tablespoons of chopped lean ham
1 tablespoon of butter
2 tablespoons of flour
1 tablespoon of sherry

Make a sauce by combining 1½ cups of the tomato juice, the Worcestershire sauce, ham, and butter and simmering for 10 minutes. Mix the flour with the remaining ¼ cup of tomato juice and add gradually to the sauce, stirring constantly. Season to taste.

Keep the sauce hot over hot water while grilling the steak. Saute the onions until tender. Place the steak on a hot serving dish and cover with the onions.

Stir the sherry into the sauce and pour over the grilled steak and onions.

Fricassee of Veal

2 lb of filleted veal
1 onion, sliced
¼ teaspoon of ground ginger
Flour to thicken
2 tablespoons of butter
½ teaspoon of salt
2 tablespoons of white wine

Rub the veal with the ground ginger, cut it into small cubes, and fry in the butter with the onion. Add the wine, salt, and sufficient water to cover. Simmer gently. When the veal is tender, thicken the liquid with flour. Serve with rice.

Pork Chops in Wine

4 pork chops
1 onion, chopped
Pinch of thyme
Clove of garlic
1 carrot
½ cup of white wine
Salt and pepper

Peel the carrot and slice it thinly. Put it in a thick pan with the chops, wine, and other ingredients. Cover, and cook for 40 minutes over a fairly low heat.

Braised Oxtail

1 oxtail
2 small onions, sliced
2 small carrots, sliced
2 cups of hot water
3 bay leaves
4 cloves
2 tablespoons of red table wine
2 tablespoons of fat
1 tablespoon of chopped celery
2 tablespoons of flour
2 tablespoons of tomato sauce
Or
1 cup of tomato puree
Salt and pepper

Cut the oxtail in 2 in. pieces and brown in the fat. Mix in the onions, carrots, and celery and brown.

Sprinkle the flour over the contents in the pan. Add the hot water, tomato sauce or puree, bay leaves, and cloves and season with salt and pepper.

Cook slowly for at least three hours in a casserole or heavy saucepan. Half an hour before the cooking is complete, stir in the wine.

Serve with red currant jelly or red plum jam.

Fillets of Veal Porto

¼ pint of port wine
6 fillets of veal
Salt and pepper
1 beaten egg
1½ cups of stale breadcrumbs

Sprinkle the fillets with pepper and salt to taste and soak them in the port wine for one hour. If the fillets are large, use more port, as they must be completely covered. When required, dip them in the beaten egg, crumb, and fry in smoking hot butter. Serve with the port as a gravy (heated, and poured into a hot sauceboat).

Pears in Port

4 to 5 large firm pears
½ cup of water
6 whole cloves
½ cup of sugar
1 cup of port wine

Peel, halve, and remove the cores from the pears.

In a large shallow pan, combine the sugar, water, port wine, and cloves. Bring to the boil, stirring all the time. Put in the pears. Reduce the heat, cover, and simmer for 10 minutes or until pears are barely tender. Remove the pears from the syrup.

PALOMINO
Sherry

Make this taste-tempting confection by sprinkling sherry over fruit and coconut and chilling. (See recipe for banana-orange ambrosia.)

Boil the syrup again until it is half its original volume. Pour over the pears and chill.

Baked Bananas

Bananas (as many as needed per person)
1 oz of castor sugar
1 lemon
1 tablespoon of sherry
½ cup of orange juice
Orange peel

Peel the bananas and put them whole in a baking dish. Cover them with the juice of the lemon and the sugar, sherry, and orange juice and sprinkle grated orange and lemon peel on top. Bake at 400 degrees F for 30 minutes, basting once or twice.

Wine Cream

½ pint of cream
1 cup of castor sugar
¼ pint of white wine
1 lemon

Grate the rind of the lemon, squeeze the juice out and strain it. Put the rind and juice into a large basin and whisk with the sugar, wine, and cream until thick. Chill well. Serve with fruit.

Banana-orange Ambrosia

4 oranges
2 bananas
½ cup of coconut
2 tablespoons of sugar
1 tablespoon of sherry

Peel the oranges and cut crosswise into thin slices, removing seeds and pith. Peel the bananas, flute them by running the prongs of a fork down them, and slice them crosswise about ¼ in. thick.

Arrange alternate layers of orange and banana slices in a shallow serving dish, sprinkling each layer with sugar. Use orange slices for the bottom and top layers. Sprinkle with the sherry and coconut and chill for one hour.

Serve with whipped cream.

Pineapple Ambrosia

1 fresh pineapple
Or
20 oz tin of crushed pineapple
¼ pint of cream
½ lb of white marshmallows
1 teaspoon of icing sugar
1 tablespoon of sherry

Shred the pineapple with a fork. Cut the marshmallows into small pieces and mix with the drained pineapple. Put in a refrigerator for a few hours.

Just before serving, whip the cream with the icing sugar. Blend the sherry in with the pineapple mixture and fold in the cream. Garnish with a cherry.

Serve in individual dishes. Serves 6.

Fruit Cream

1 tablespoon of madeira or sherry
4 bananas
1¼ tablespoons of gelatine
¼ cup of boiling water
½ pint of cream
1 tablespoon of lemon juice
2 oranges
¾ cup of castor sugar
½ pint of wine jelly

Soften the gelatine in enough cold water to cover it, then dissolve it in the boiling water. Add the sugar. Sieve the bananas with the fruit and juice of the oranges and the lemon juice, and stir in the gelatine. Mix well. Stir until the sugar is dissolved. Add the wine and allow to cool.

Beat the cream stiffly and fold it into the mixture. Turn into a wet mould. When set and chilled take it out of the mould and decorate with chopped wine jelly.

Sufficient for 6 persons.

Wine Jelly

1 pint of white wine
2 to 3 teaspoons of gelatine
Sugar to taste
1 tin of evaporated milk
Or
1 cup of fresh cream

Slightly heat the sugar and wine and melt the gelatine in it. Leave in a cool place and before the mixture sets, whisk in the milk or cream. Serve well cooled.

Doughnuts in Wine Sauce

3 eggs
3 tablespoons of sugar
3 tablespoons of flour
½ teaspoon of baking powder
Pinch of salt
Fat

Beat all the ingredients into a soft batter. Drop spoonfuls of this batter into deep, boiling fat and fry quickly until golden brown. Serve covered with wine sauce.

Wine Sauce

1 pint of white wine
1 dessertspoon of sugar
2 eggs
1 teaspoon of lemon juice

Mix all the ingredients in a basin and stand in a saucepan of boiling water. Beat well until frothy.

Lemon Cup

2 pints of white wine
2 dessertspoons of sugar
½ bottle of soda water
Juice and peel of 1 lemon

Melt the sugar with the lemon juice, mix in the wine, and pour into a jug. Peel a lemon very thinly and plunge the peel into the jug for five minutes. Chill well. Add the soda water and serve at once.

Hot Punch

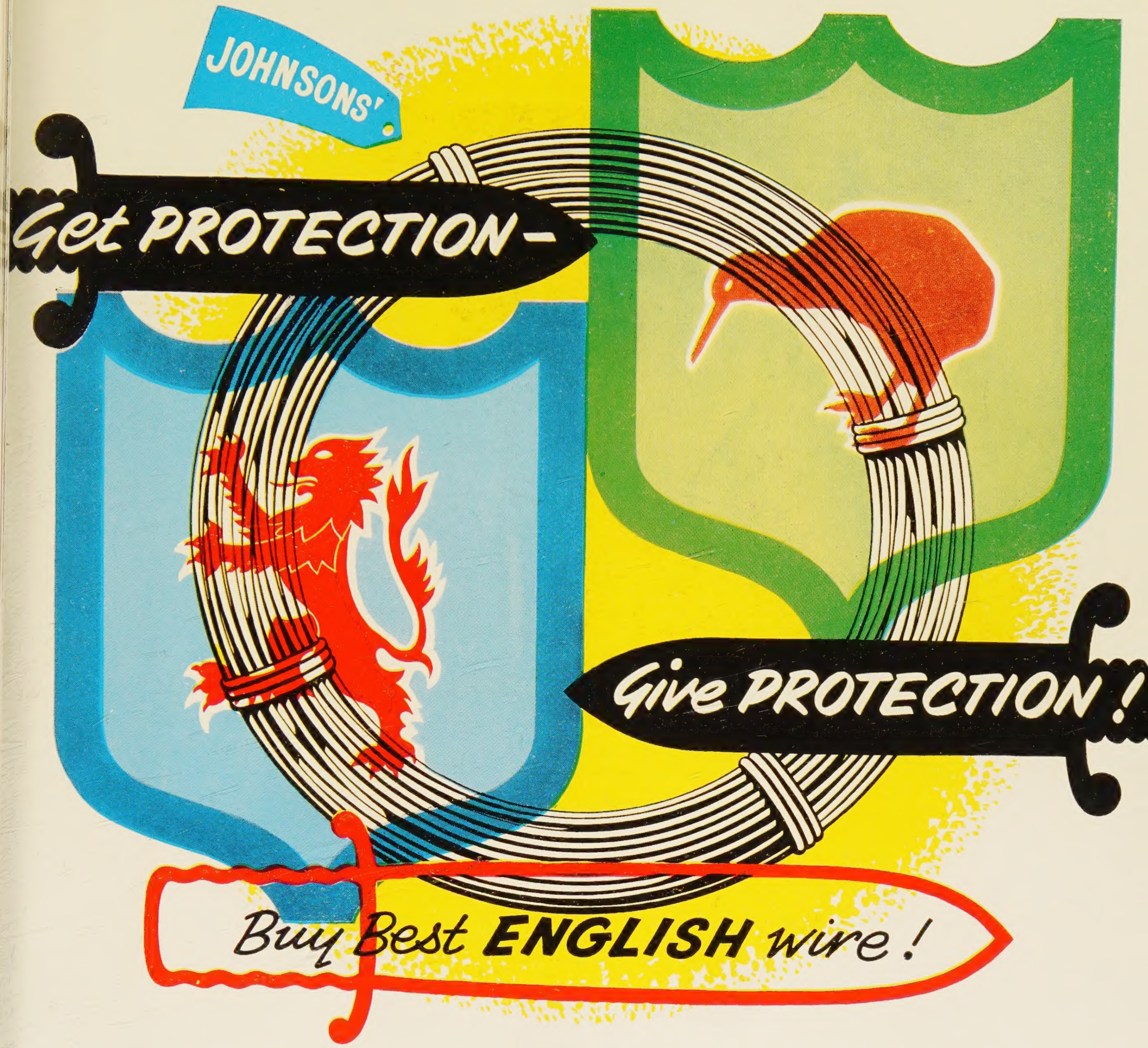
2 pints of red wine
Juice of 1½ oranges
Pinch of nutmeg
Pinch of cinnamon
1 dessertspoon of brown sugar

Heat but do not boil the wine. Mix in the other ingredients and pour into a bowl or jug. Decorate with slices of orange or lemon.

Photographs by Sparrow.

* * *

Printed by Blundell Bros. Ltd. (The Evening Post), Wellington—19367


JOHNSONS'
Get PROTECTION –
Give PROTECTION!
Buy Best ENGLISH wire!

Buy the best English wire and protect your valuable investment both ways . . . protect your source of supply and protect the source YOU supply. JOHNSONS' ENGLISH WIRE gives such long lasting protection at such little cost compared with the total price of the fence. JOHNSONS' ENGLISH WIRE, drawn with the skill of 150 years' experience is protected by patented Hot Dip Galvanising. This ensures long life in New Zealand's climatic conditions and JOHNSONS' WIRE is particularly resistant to the corrosive action of salt-laden air. JOHNSONS' 12½ gauge Super Dreadnought is economical for high country. It yields 1,458 yards to the cwt. as compared with 546 yards for 8 gauge and has equivalent breaking strength.

Johnsons' ENGLISH fencing wire

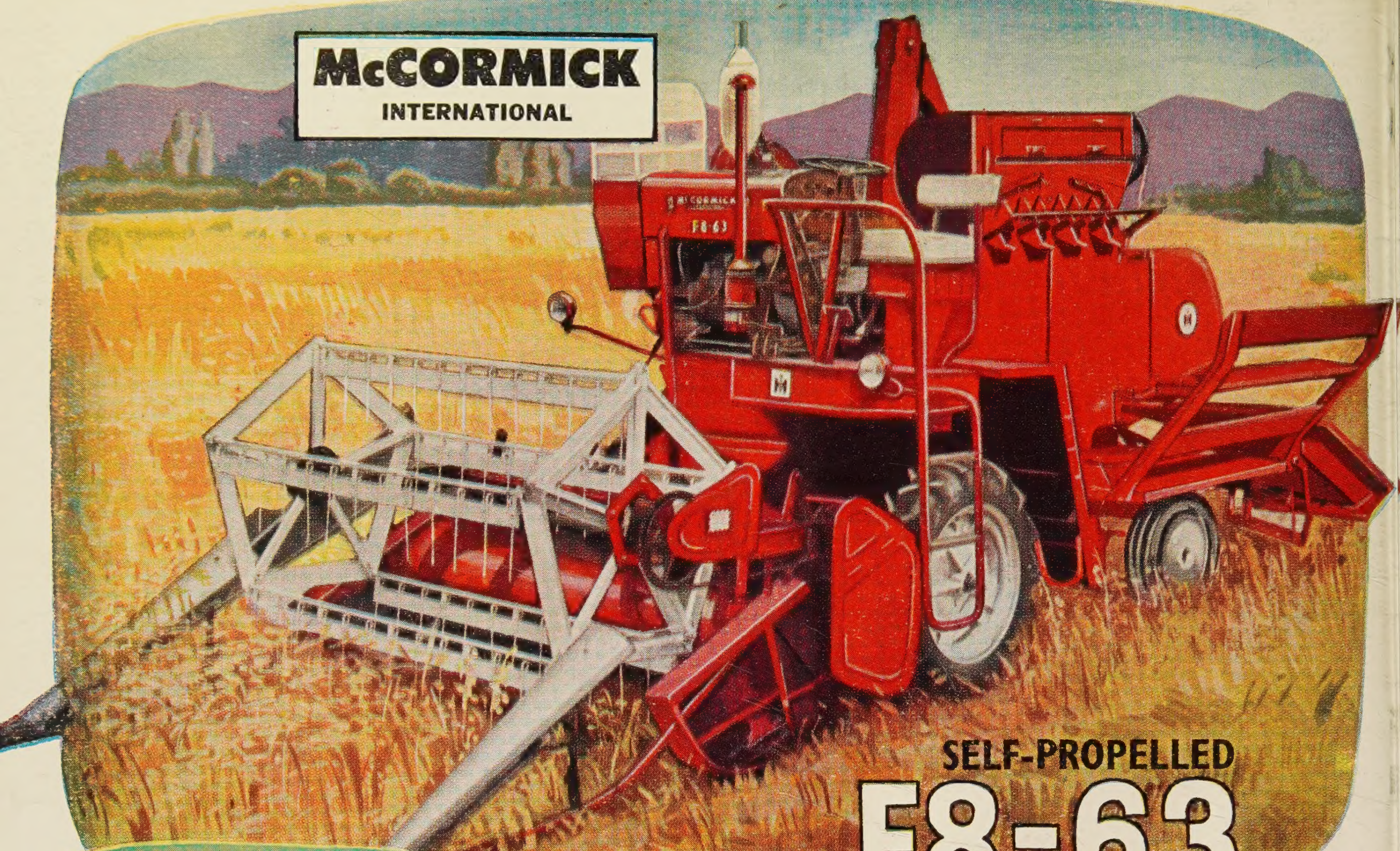
Manufactured by: RICHARD JOHNSON & NEPHEW LTD.
MANCHESTER, ENGLAND

OBTAINABLE FROM ALL STOCK AND STATION AGENTS
AND HARDWARE MERCHANTS EVERYWHERE

SOLE N.Z. AGENTS: JOSEPH NATHAN & CO. LTD.

WELLINGTON (Head Office) • AUCKLAND
CHRISTCHURCH • DUNEDIN

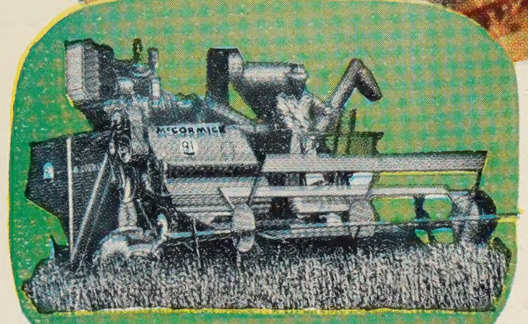
McCORMICK
INTERNATIONAL



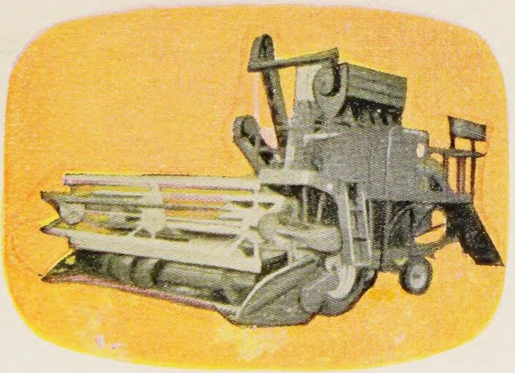
SELF-PROPELLED

F8-63

HARVESTER THRESHER



No. 91 8½ ft. cut—self-propelled.
40 h.p. Magic circle planetary steering.



No. 151
12 ft. cut—self-propelled 70 h.p.—
screen or grain tank

IN BIG DEMAND

. . . order yours NOW!

The McCormick International F8-63 harvester thresher handles any volume without clogging or wedging; gives unexcelled threshing, cleaning and grain-saving performance.

"Straight-through" Operation ensures high-speed working with no hold-ups through clogging or bunching.

"Balanced-flow" gives perfect handling for any volume of grain.

"Positive separation" gives as much separating capacity as many bigger machines, with double-cleaning of the seed under a controllable air-blast.

- Cutting width: 7ft. (including gather).
- Two models—standard with bagging platform, combination model with grain tank and bagging platform.
- 3 forward gears (with variable speeds), giving .81 to 2.81, 1.34 to 4.7, 3.29 to 11.45. Reverse 1.18 to 4.14.
- 30 h.p. International petrol or diesel-engine functioned with controlled pace.

ALL IH DEALERS ARE DEMONSTRATING NOW!

INTERNATIONAL HARVESTER CO. OF N.Z. LTD.
Branches and Dealers throughout New Zealand
Licensed Motor Vehicle Dealers H.1403

INTERNATIONAL HARVESTER